THE ROLE OF INTERACTIVITY IN THE ARTISTIC PROCESS OF WEB-BASED ART: CASE STUDIES OF THE DIGITAL MEDIA ART PIONEERS' PRACTICES AND STUDIO TEACHING

by

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ABSTRACT

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This qualitative case study began with a question: How can interactivity be taught, in particular online interactivity? Additionally, how does the teaching artist's practice of online interactivity inform their studio teaching of interactive related themes? As such, this study first discloses patterns of the three select digital media artists' artistic experiences of online interactivity. Then, this study aims to explore the reciprocal relationships between their practices and studio teaching. The three participating artists include: Lynn Hershman Leeson, Rafael Lozano-Hemmer, and Martine Neddam. The three selected artists have worked with digital media, with a focus on the Internet and online web browsers since the mid to late-1990s, when the Web was in the early stages of its public access and information deployment.

In order to probe into this study's research theme through the artists' own voices, this study conducts in-depth interviews via email and Skype meetings. This study also employs In Vivo coding for data analysis in order to closely examine the interview data. The findings present a unit of discovered key concepts in response to the central research question and its sub-questions.

In response to the role of online interactivity in the artistic process, four key concepts have emerged: *active participation*, *relationship*, *freedom*, and *artistic language*. The artists believe that the creation of online interactivity has its roots in

critical reflection of digital culture with humanistic views. In regard to pedagogical and instructional strategies related to the participating teaching artists' practices of online interactivity, the three primary patterns discovered in this study are: *artistic experience*, *problem-solving* and *dialogue*.

Surprisingly, the findings show that the artists' responses to their pedagogies present a general view of studio art reaching, rather than an emphasis on teaching online interactivity in particular. The artists described that their pedagogies are informed by their practices, which deal with different challenges in a problem-solving process. These problems cover technological skills, practical matters, and mindsets. For the artists, their role of the artist-as-teacher is to guide their students in developing the ability to think holistically, and give them problem-solving skills in the students' individual artistic processes.

DEDICATION

For Julie Lin and Thomas Lee

獻給 林碧霞與李廷明

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I thank my family for their faith in me and their unconditional support in allowing me to be as ambitious of an artist and researcher as I wanted to be: my parents, my brothers and sisters, and my nieces. A very warm and special thanks goes out to The Arctic Circle director Aaron O'Connor for his thoughtful and inspiring comments on the modern world. I would also like to thank my supportive friends and mentors for their intellectually stimulating conversations on this roundabout voyage: Professor Jonathan Crary, Daisy Lee, MengHaur Lee, Tina Lin, Larry Liu, Chris Moffet, Brian Mulroney, Yoko Ohashi, TzuChien Peng, Andy Taylor, and Professor Ruth Vinz.

Chia-Ling Lee

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

Chapter I

INTRODUCTION

The Background to the Problem and Personal Relevance

People in my homeland of Taiwan refer to their island as *The Island of Technology*. For example, Taipei, the capital of Taiwan, provides everyone free wireless Internet access. In Taiwan, digital signage displays and interactive touch screens for diverse purposes are also easily found on the street, in stores, and in public transportation stations. In addition to this integration of technology into daily life, the Taiwanese government has promoted a national policy which emphasizes digital technology in national development and aims to transform Taiwan into an *E-society* (Taiwan National Development Council, 2003). After returning to Taiwan after receiving my MFA degree from the Pratt Institute, I witnessed the transformations that took place during 2002-2007, in particular as a result of "the 2008 Six-Year National Development Plan Challenge," the core goal of which was to build a *Green Silicon Island* and new social, cultural, political and economic activities to form an *e-Taiwan society* (Taiwan National Development Council, 2003). The most recent significant national policy related to these goals was the founding of the Taiwan Ministry of Science and Technology (MOST) on February 3rd, 2014. MOST's previous iteration was the National Science Council which was established February 1st, 1959. MOST fosters and promotes the development of technology in various fields, including science, natural science, life science, sustainability science, engineering, economics, education, social science, and the humanities.

Echoing both global and domestic digital trends, Taiwanese local art universities and cultural institutes have showed an increased interest in the relationship between art and technology. Art universities have established many digital and media related art programs in both fine arts and design disciplines since the year 2000. During this time, I held a teaching position in the Fine Art Department at National Taiwan University of Arts (NTUA). Through my teaching experience at NTUA from 2002 to 2007, I developed a deep interest in the integration of art and technology, particularly as they related to my own and art students' creative practices. I therefore incorporated art and technology-related topics in my curriculum.

Because the focus of the Fine Arts Department at NUTA was not on new media at the time~~,~~ the Fine Art Department offered only a few media courses to art students. However, my students often showed a strong interest in exploring digital media and integrating digital technology into their creative processes. My students' questions were often related to the history of art and media artists' creative processes. The students asked me both in and outside of class. For example, "What are early examples in the history of art relevant to the development of digital art?" "Who are pioneering digital artists and what type of digital works do they create?" "What software and devices are used to create an interactive work?" "How do interactive activities in digital artwork change the form of artwork?" "Is digital technology a tool or a medium?" "Is Internet art art?" My students' creative experiences of digital technology echo American art education researcher Sydney Walker's (2004) study on art students' artmaking processes. Walker articulates that art students often seek to learn from professional artists' practices in their artmaking experiences because they can explore "possible big ideas." According to Walker, "big ideas" refer to "themes, issues, or perhaps questions" which form the artistic practice. Walker explains:

> The undergraduate and graduate students initially investigated the artmaking process in the practices of professional contemporary artists as

> revealed in artist interviews (published and video-recorded), artworks, and critical writings seeking evidence of the artists' process in creating artworks. Students identified possible big ideas that informed each artist's practice and considered how personal connections, problem solving, knowledge, and boundaries assisted the artist in exploring and expressing these big ideas. (p. 8)

As a result of this interest, I began to incorporate relevant course themes of digital media into my curriculum design. For example, in my course Curatorial Practice, I included assignments which involved curating digital art works. For the course Guest Speaker Series, I invited Taiwanese and international media artists, curators, theorists, and researchers to lecture on aesthetic and cultural inquiry in art and technology. Speakers included the curator of the media art exhibition *Navigator* Wang Jun-Jieh, and the first Taipei Digital Art festival and ETAT Lab director Huang Wen-Hao.

In addition to my teaching, I helped organize international conferences held at NTUA's Fine Arts Department, for example *Traversing Fantasy: International New Media Arts Festival* in 2007. *Traversing Fantasy: International New Media Arts Festival* was one of very few conferences in Taiwan which invited influential artists and scholars in the field of media art to reflect on art and technology. Conference keynote speakers included Jeffrey Shaw, a media art pioneer, and Guillaume Paris, a new media professor at Ecole Nationale Supérieure des Beaux-Arts de Paris (ENSBA). Shaw's presentation at *Traversing Fantasy* examined virtual reality and the viewer's interactive experience. In particular, he explored the relationship between the development of cinematic imaginary and digital artwork through four characteristics: interaction, narration, augmentation, and immersion. The experience of participating in *Traversing Fantasy* expanded my interest in exploring not only digital art as it relates to the technological innovations of computers, software and the Internet, but also its larger context in modern visual culture and cinema. My academic experience at NTUA and technological trends in Taiwan in the early 2000s left me with the desire to further research the connection between creation and technology.

I was interested in having conversations with other artists on materials and forms employed by artist in their working environments, in addition to philosophical and aesthetic concerns. Coming from a background in studio art training, I always want to learn more about how other artists "make" and "produce" a work of art, and what the concept is behind the work. The artistic process leading to a work of art often seems mysterious, involving unknown matters. While artists often talk about what they want to convey and transmit as an idea or concept, for example as an artist statement, it is very rare to find a public discussion of the artists' "processes."

I remain interested in technical and material factors of Irwin's *Homage to the Square³* (1999-2000). For example, what kind of participatory experience did Irwin intend for the viewer when he created, not psychical objects, but light and screened gallery spaces? How did Irwin design these wood structures in order to support translucent screens in *Homage to the Square³*? How were light fixtures behind the screens arranged? As a result of inspirations such as Irwin, my own artwork began requiring larger spaces in which the viewer would be situated in an installation surrounded by a panorama of abstract scenes. The viewer's body was invited to be part of my installation, which served as a mediating interface between the viewer's real world and the artist's wonderland (Lee, 2001).

Another example of my interest in other artists' artistic processes is my participation in an artist-in-residence program at Centre d'Art à Marnay sur Seine (CAMAC) in France. During the residency period, a Mexican photographer and I talked about his portrait project in his photo studio. He explored people's emotions, such as laughing, crying, and being upset by having their portraits shot. We started a conversation about how photography represents a moment of the creator's own point of view. As the conversation developed, we discussed how he represented these people's authentic expressions from a technical perspective. We explored themes related to lighting, camera models, camera lenses, aperture and speed, and subject's postures. Our conversation

ended with a discussion of interactions between him as an artist and people as subjects during the shooting process.

With all my experience of art and teaching, I have reflected on the idea of interactivity in my own practice, art history, and related theories. Coming from a traditional training of working with tangible materials, my artistic practice is rooted in tangible media, such as painting and video installations but creation of interactivity in my own art practice is built around electronic interactions. As a result, I was eager to explore how digital interactivity is conceived and created in the artistic process, which truly seemed an unknown world to me. Although interactivity is truly essential to the perception of artworks and can be applied to every art form, I would like to better understand the role of interactivity and digital technology in the artistic process and transform this understating into a pedagogy of studio teaching. I am particularly interested in web-based art for the following reasons: First, web-based art shifts the focus from a work's objecthood to its interactive experience with the viewer. Web-based art, unlike static traditional painting and sculpture displayed in a physical space create the viewer's interactions on private or public computing devices which connect to the Internet. Second, interactivity, as one of many essential characteristics in web-based artwork, requires an understanding of aesthetic concerns, computer programming techniques and knowledge from both new and traditional fields. Third, we are surrounded by digital information exchanges through interacting with a variety of computing devices, in particular online communication. Using the Internet has become a common daily activity in much of society around the world.

Historical and Contextual Background

The evolving relationship between technology and humans has shifted through different social-cultural contexts. For example, human history has evolved from the

industrial society of modern machinery in the nineteenth century into the global village of broadcasting in the twentieth century and finally into the information community of virtuality in the twenty-first century (Benjamin, 2008; McLuhan, Fiore, & Agel, 1967; McLuhan & Powers, 1989). This socio-cultural relationship between humans and technology has shifted from a dependence on industrial machinery to digital devices (Paul, 2003; Turkle, 2008). The digital society eclipsed analog electronic machines and the global village of the broadcasting period. The development of advanced digital technology pervades much of our daily life, making it a defining characteristic of an interactive and collective lifestyle (Berners-Lee, Cailliau, Groff, & Pollermann, 2010; Bush, 1945). We have progressed into global instantaneous interactions via the Internet, where the physically absent body actively transmits information in the virtual world (Turkle, 1995).

A day in today's digital world may look like this: people turn on a computer device which connects to the Internet. People globally communicate for work and personal affairs by using a variety of online or offline software, listen to music and watch multimedia online, and participate in online communities (Berners-Lee et al., 2010). Two vital factors contribute to today's online world, including the commercialization of the Internet and the World Web in the 1990s and a low-cost market of personal and home computers in the 1980s (Berners-Lee et al., 2010; Greene, 2004, Leiner et al., 2009).

The history of the Internet primarily develops technological solutions for information distribution through "collaboration and interaction between individuals and their computers without regard for geographic location" (Leiner et al., 2009, p. 22). The term Internet was defined by the U.S. Federal Networking Council (FNC) on October 24, 1995. as follows:

> The Federal Networking Council (FNC) agrees that the following language reflects our definition of the term "Internet." "Internet" refers to the global information system that—(i) is logically linked together by a globally unique address space based on the Internet Protocol (IP) or its subsequent

> extensions/follow-ons; (ii) is able to support communications using the Transmission Control Protocol/Internet Protocol (TCP/IP) suite or its subsequent extensions/follow-ons, and/or other IP-compatible protocols; and (iii) provides, uses or makes accessible, either publicly or privately, high level services layered on the communications and related infrastructure described herein.

The FNC's (1995) resolution defines the Internet as a "global information system" from a technical view of data transfer. Furthermore, some literature traces the history of the Internet back in 1960s from aspects of technological developments (Berners-Lee, 1996; Greene, 2004; Leiner et al., 2009). In particular, in the 1960s, the U.S. Department of Defense funded the development of the ARPANET project, which was early packet switching networks (Berners-Lee, 1996; Greene, 2004; Leiner et al., 2009). In September 1969, ARPANET successfully sent the first message between two remote network nodes, including the first network node at American computer scientist Leonard Kleinrock's Network Measurement Center in UCLA and the second one at Stanford Research Institute (SRI) (Berners-Lee, 1996; Greene, 2004; Leiner et al., 2009). Later, two more network nodes were added at UC Santa Barbara and the University of Utah (Berners-Lee, 1996; Greene, 2004; Leiner et al., 2009). Before the commercialization of the Internet in the 1980, the use of the Internet was for governmental and military purposes (Berners-Lee, 1996; Greene, 2004). The history of the Internet had go through difference stages, including early research in the 1960s, the development of the Internet in the 1970s, commercialization in the 1980s, and personalization of the web information in the 1990s (Berners-Lee, 1996; Berners-Lee, Cailliau, Luotonen, Nielsen, & Secret, 1994; Berners-Lee et al., 2010; Leiner et al., 2009). This study focuses on web-based art from the late 1990s onwards.

In 1989, a turning point for the evolution of the Internet occurred when English computer scientist Tim Berners-Lee proposed to bring together "a global information universe into existence using available technology" (Berners-Lee et al., 2010, p. 461). Berners-Lee's design of the World Wide Web (the WWW, W3, or the Web) "allows both

operations and provides access from any browsing platform" (p. 461). W3 is now a leading application used for personalization of data transfer by global Internet users (Berners-Lee, 1996; Berners-Lee et al., 2010; Greene, 2004; Leiner et al., 2009). Most important of all, on April 30, 1993, The European Organization for Nuclear Research (CERN) announced that web technology would be freely usable by anyone, with no need to pay fees to CERN (*A Little History of the World Wide Web*; Berners-Lee et al., 2010; Giampietro, 2013).

Berners-Lee's W3 concept was inspired by an essay, "As We May Think," written in 1945 by electrical engineering scientist Vannevar Bush, who worked for the US military (Berners-Lee et al., 2010; Greene, 2004). When discussing recording research data, Bush's essay, "As We May Think," suggests that a device named Memex enables users to work with diverse textual and visual data at the same time. As Bush (1945) describes, "A memex is a device in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility. It is an enlarged intimate supplement to his memory." Berners-Lee's W3 model realizes Bush's dream of using machines to expand human knowledge (Berners-Lee et al., 2010). As Berners-Lee et al. (2010) explain the concept of W3:

> Since Vannevar Bush's article (1945), men have dreamed of extending their intellect by making their collective knowledge available to each individual by using machines. Computers give us two practical techniques for human-knowledge interface. One is hypertext, in which links between pieces of text (or other media) mimic human association of ideas. The other is text retrieval, which allows associations to be deduced from the content of text. In the first case, the reader's operation is typically to click with a mouse (or type in a reference number). In the second case, it is to supply some words representing that which he desires. The W^3 ideal world allows both operations and provides access from any browsing platform. (pp. 461- 462)

According to Berners-Lee et al. (2010), the Internet application W3 "involves hypertext links and index searches" (p. 462). Berners-Lee used the NeXTSTEP operating system to create the pilot project W3 in 1990. A NeXT-Step computer used "graphic user

interface tools" and "hypertext browser/editor [to demonstrate] the ease of use of a window-based hypertext interface to global information" (p. 467). Since then, various web browser applications have been written to support W3's data transfer of texts, images, and multimedia on different computer operating systems, for example Marc Andreessen's Mosaic in 1993, Netscape in 1994, Microsoft's Internet Explorer (IE) in the late 1990s, Mozilla Foundation's FireFox in 2002, Google's Chrome in 2008, among others (*A Little History of the World Wide Web*; Berners-Lee, 1996; Berners-Lee et al., 1994; Greene, 2004).

Another important factor contributing to today's digital world is the invention of personal computers in the mid-twentieth century, which has revolutionized civilization (Rosenblatt, 1983). In 1982, the *Time* Magazine cover of "Person of the Year" instead named a personal computer as "Machine of the Year." Beneath the subtitle "The Computer Moves in" was a plaster sculpture of a man created by George Segal looking at a computer. In addition, American computer scientist Mark Weiser's (1991) essay, "The Computer for the 21st Century," proposes an optimistic vision of "ubiquitous computing" for future generations at the very outset of this newly forming digital society. Weiser believed that technology should be blended into everyday life. Therefore, in order to achieve the world of ubiquitous computing (ubicomp), the physical presentation of ubicomp needed to be produced as a cheap and low-power device that requires a network, as Weiser notes. This concept of ubicomp prophesied a digital utopia where people would perceive a given moment by interacting with different types and sizes of screens through touching and clicking.

Two decades later, forms of Weiser's (1991) ubicomp devices are now common in our everyday life in the form of smart phones, digital cameras, GPS, ATM machines, and so on. People now interact with digital technologies by moving their fingers on a screen or talking to a device. In the digital society, interacting with artificial intelligent machines is not only a sensory experience, but also "somatic" enjoyment, whereby we are

immersed in haptic experiences. British media theorist Mark Paterson (2007) describes digital interactivities as "the new pleasure in the body" in life (p. 149). The current digital trend promotes an innovative dimension of the human sensorium experience.

The digital revolution has also influenced the art world in many ways. Since the 1980s, art-making has increased its incorporation of digital technology into the artistic process (Edmonds, 2010; Edmonds et al., 2005). Artists have expanded the array of artistic media used in art-making and shift more and more toward the use of digital technologies and digital processes. Many artists work with computers for either traditional or computer-based presentation. Digital media are often discussed as immaterial media in many media art theories, especially in comparison with traditional artistic materials. As such, American media art theorist Christiane Paul (2003) argues that digital technology extends from a singular visual interaction with a static art object to multi-sensory interactions in a work of digital art itself.

Many cultural institutions, such as international biennial exhibitions, have investigated the impact of technology on art, for example the third Biennale d'Art Contemporain de Lyon titled *Interactivity, Moving Pictures, Video* in 1995. Curator Georges Rey examined the extensive impacts of technological mediums in the twentieth century on artistic creation through five important historical events in the history of technological innovations and art. The five events are described on the official website of the third Biennale d'Art Contemporain de Lyon (1995):

> **1895**: The Lumière brothers made the first cinematograph Workers Leaving the Lumière Factory in Lyon (La Sortie des Usines Lumière à Lyon).
>
> **1914**: English engineer Archibald Montgomery Low presented TeleVista in London as the first demonstration of television.
>
> **1936**: English computer scientist Alan Turing provided the first mathematical formalization of a programmable computer.
>
> **1963**: Nam June Paik and Wolf Vostell created the first electronic and televisual images.

> **1995:** The third Biennale d'Art Contemporain de Lyon examined artworks which engage video and cinema, information technology, and virtual reality.

The curatorial concept of the third Biennale d'Art Contemporain de Lyon demonstrated that advanced technology allows artistic approaches to amplify a way of "seeing" that involves dynamic interaction. In addition, in the last year of the twentieth century, the 2000 Whitney Biennial for the very first time included Internet art and treated Internet art as equal to other mediums. Maxwell L. Anderson, the director of the Whitney Museum at the time, explained that "as of 2000, Internet art can no longer be ignored as a legitimate art form" (Jana, 2000). Anderson's statement announced the new age of digital technology in the art world.

The Concepts of Interactivity and Interaction

This study intentionally uses the word "interactivity" to focus on exploring patterns of the artist's creation and its relation to studio pedagogy. In order to define the research scope and focus, this section identifies differences between the concepts of interactivity and interaction in the creative process of digital media art in a general sense.

First of all, exploring the role of interactivity and interaction in different stages of the aesthetic process provides some clarifications of differences between the two. (Kluszczyński, 2010; Kwastek, 2013; Lopes, 2010; Saltz, 1997). For example, European digital art historian Katja Kwastek (2013) differentiates interactivity and interaction by "instrumental and phenomenological characteristics" in the creative process of interactive digital art (p. 119). She explains:

> The aesthetic experience of interactive art is based on the interplay between instrumental constellations, their processual activation, their material staging, and their contextualization within different possible systems of reference and individual horizons of experience. These aspects will therefore constitute the focus of the observations that follow, beginning with the rule systems of interactive art, which mediate between the processuality and the interpretability of the interaction systems and thus serve as a link between instrumental conditions and their individual perception. (p. 126)

Kwastek's (2013) observation above explains that interactivity and interaction are fundamentally different within an interactive system of digital media artwork. In other words, the artist's creation of interactivity develops "the action potential of the interaction," which then follows the user's (or the recipient's, to quote Kwastek), performance of "the moments of its realization or actualization" (p. 117). Furthermore, "artists have conceived and implemented through the technical system" in order to produce interaction (p. 121). Kwastek's concept of the instrumental relationship between interactivity and the technical system can be illuminated by Saltz's (1997) and Lopes's (2010) elaborations of the interactive system and its programming process. As Lopes explains, "Interactivity requires a mechanism that control input-output transitions and computers accomplish this by running computational processes" (p. 45).

Similarly, Polish media art researcher Ryszard Kluszczyński (2010) argues that "an artist does not make a final, completed piece of art, instead [of] produces an area of activity for the receivers, whose interactive actions bring to life an artwork-event" (p. 2).

Additionally, in their discussion of mechanism, both the US scholar David Saltz (1997) and the Canadian philosopher Dominic McIver Lopes (2010) use the computing process of data input and output to describe the interactive system of computer art. For example, Lopes states, "Computer art works exploit the technology of computing in order to achieve interactivity" (p. 27). In the same way, Saltz (1997) argues that interactive computer art is conditioned by the following required computing process:

> (1) A sensing or input device translates certain aspects of a person's behavior into a digital form that a computer can understand. (2) The computer outputs data that is systematically related to the input (i.e., the input affects the output). (3) The output data are translated back into real-world phenomena that people can perceive. (p. 118)

The first two stages above involve a process of designing and programming interactions. The last phase shows engagement of the user's participatory interactive activities. Although interactivity and interaction performs different roles in the creative process of

interactive art, the relationship between the two is reciprocal. As Lopes (2010) writes, "Interactivity requires nothing more of the display than that it be variable and apprehended by users" (p. 52).

Apart from interactivity's instrumental and computing characteristics, interaction also refers to the user's responsive and perceptive activities in interactive digital artwork (Edmonds, 2010; Kluszczyński, 2010; Kwastek, 2013; Lopes, 2010; Saltz, 1997). British computer artist Ernest Edmonds (2010) uses the concept of play in computer games to parallel the interaction in games and artworks in which "[the] human, confronted with the artwork (or game) takes an action that the work responds to. Typically a sequence of actions and responses develop and continue until a goal is reached or the human is satisfied or bored" (para. 13).

In another example, Kluszczyński (2010) describes interaction as the user's participation in an event. He explains that "interaction required by spectacles of such sort, various activities undertaken by the participants for the spectacle to actually take place, activity expected from them (even though minimal), makes them eventually a part of such event" (p. 24).

To conclude, this study employs the concept of interactivity in order to disclose the artists' experiences of designing and programming interaction (Kwastek, 2013; Lopes, 2010; Saltz, 1997).

Media, Art, Interactivity

In regard to media technology and art creation, there are art forms that use media technology as a platform or mode of working (e.g., digital photography). Although the term *interactive art* often suggests the interactive tendencies of media technology, not all interactive art is based in media technology (Dinkla, 1994; Kwastek, 2013; Lopes, 2010). Similarly, some argument can be made that all art, is in some sense, interactive (Lopes, 2010; Paul, 2003). This section of overlap among art creation, media technology, and

interactivity clarifies each individual category of media art (see Figure 1). As such, what follows is a description of the larger context and terminology describing the relationships between media technology and art.

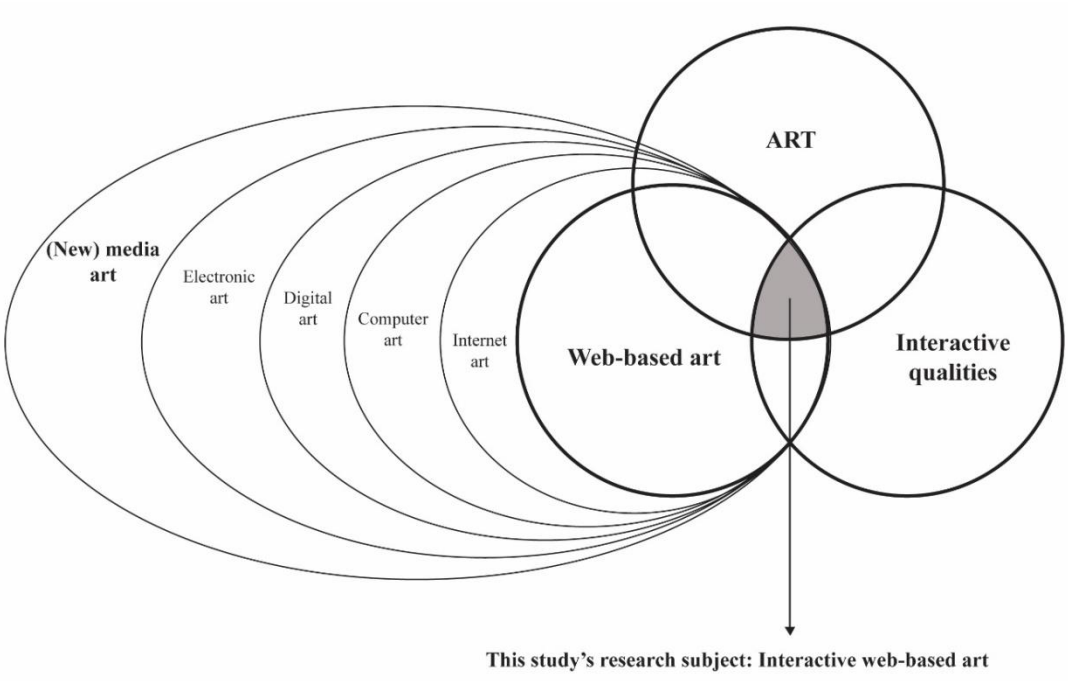

Figure 1. This Study's Research Subject: Interactive Web-based Art

Note: This diagram presents "Media art" as a broad term for the artistic use of electronic media (Kwastek, 2013, p. 1). In addition, this diagram shows the focus of this study is on interactive web-based art.

From New Media to Web-based Art

"Media art" is a broad term for the artistic use of electronic media, according to European media art historian Katja Kwastek's (2013) argument. Additionally, focusing on later developments in computing, the media art theorist Lev Manovich (2001) suggests "new media" as involving materials that "have become computable," including graphics, moving images, sounds, shapes, spaces, and texts (p. 20). According to Manovich, principles specific to new media are: numerical representation, modularity,

automation, variability, and transcoding. If this is the case, the term (new) media art is perhaps a better description.

However, this does not yet distinguish between digital and analog forms, and might also include forms such as telecommunications, radio and video. As Edmonds (2010) notes, "Digital art is increasingly interactive. Some of it is built on notions that come from computer games and much of it is intended to engage the audience in some form of interactive experience that is a key element in the aesthetics of the art" (para. 1). The emergence of digital media in the art world in the late 1970s and 1980s brought about a focus on the viewer's direct physical participation as a trigger for changing digital contexts. For example, Jeffrey Shaw's original version of his piece *The Legible City* (Manhattan) in 1989 represents one of the early computer controlled installations with an emphasis on the viewer's interactions with the work.

Digital art, according to Kwastek (2013), defines new genres of media art in the 1990s as immaterial works conceived by "code, software, or data—such as Internet art—but also to installations and performative works that use digital media" (p. 4). Kwastek suggests more specific terms than media art, such as computer art in the early days of computer-generated graphics and digital art in the 1990s. Following the development of digital technologies for widespread personal use, artists have increasingly incorporated digital technologies into their artistic production processes, as Kwastek notes.

Lopes (2010) likewise distinguishes digital art and computer art from the more general term "new media art." He claims that "digital art involves computer-based encoding in a common digital code" and further clarifies: "an item is a work of digital art just in the case that (1) it's art (2) made by computer or (3) made for display by computer (4) in a common, digital code" (p. 3). Lopes describes computer art as consisting of the following features: "(1) it's art, (2) it's run on a computer, (3) it's interactive, and (4) it's interactive because it's run on a computer" (p. 27). Here he is already distinguishing interactivity as an essential component of the work itself, which suggests that digital art

simply displayed or created on computers falls outside the scope of computer art. Computer artworks, in short, use technology to generate, deliver and perform interactivity, according to Lopes.

Kwastek (2013) further distinguishes interactive art from digital art by articulating the viewer's physical inactions in the work. In her book *Aesthetics of Interaction in Digital Art*, Kwastek writes, "Digital artworks that require the viewer to engage in some kind of activity that goes beyond purely mental reception are commonly designated as 'interactive art'" (p. 4).

When the Internet became publicly accessible for commercial purposes in 1993, artists began to work with the Internet and the World Wide Web (Berners-Lee et al., 2010; Greene, 2004). In the mid 1990s, the standardization of Hypertext Markup Language (HTML) led to more dynamic possibilities when designing web pages by incorporating graphics, texts, animations, video, audio, and other multimedia elements (Greene, 2004; Manovich, 2001). As these online interactions were decoupled from local sites (galleries and museums), the nature of interactivity in Internet art seems to have shifted toward more personal and private interactions. The viewer's personal access in interactive Internet artworks is specific to individual computers, monitors, selection devices, and at the same time, more globally distributed participation. As a result, the Internet enables remote communication, which has been used in artistic explorations (Paul, 2003).

The protocol of presenting and experiencing Internet art relies on computers, not only desktops, but also laptops, cell phones and any Internet-connected devices (Greene, 2004). Internet art involves a variety of "tools," which are not limited to computer based software programs (e.g., Microsoft Word or Adobe products) but also includes web-based software and applications, web browsers, websites, webcams, networked surveillance, GPS, and networked communication technology (e.g., email, text messages and chat rooms) to name a few (Bolter & Grusin, 1999; Greene, 2004; Paul, 2013). Internet art,

thus more specifically and distinct from computer art, "plays with protocols of the Internet, with its technical peculiarities" (Baumgärtel, 2001, p. 24).

We should also make a further distinction between the Internet and the Web. While "the Internet" is often used interchangeably with "the Web," the World Wide Web (the Web) is a more specific sub-set of Internet functioning. Web-based art, as Paul (2003) notes, launches a new form of artistic expression in the realm of digital art. The World Wide Web is based on a platform of transferring hypertext that allows people to access HTML, including online social networking, ASCIII codes, websites, urls, hyperlinking, hypertext (Bolter & Grusin, 1999; Manovich, 2001; Paul, 2003). There are a variety of web-based artworks such as hypertext projects, net activism, and performance and time-based projects, as Paul writes.

It appears that with the emergence of new media, and then more specifically with web-based media, questions about the nature and possibilities of interactivity have become important concerns in the media art field (Ippolito, 2002; Kluszczyński, 2010; Kwastek, 2013). The essential character of the World Wide Web is one of interactivity. Internet users choose which websites to visit, click on the content they want, exchange messages on social networks, and search keywords in multiple online search engines and databases for information. As online work and communication have become common daily activities in the digital age, an artist also uses these same technologies to create interactive art. Digital media artists can now create and upload an interactive work to communicate with a global audience (Greene, 2004; Ippolito, 2002). As Jon Ippolito, the former Assistant Curator of Media Art at the Solomon R. Guggenheim Museum, New York, argues in his article, "Ten Myths of Internet Art," web-based art makes possible the presenting and experiencing of interactive artworks outside of traditional time and space constraints. During the course of the Internet art development, from the mid-1990s up to the present, most media art theories examine the viewer's interactions with the artwork (Greene, 2004; Kwastek, 2013).

In this study, I use the term *interactive web-based art* to designate my focus on three digital media pioneers who use interactivity and the World Wide Web in their artistic processes.

Problem Statement

Since the end of the twentieth century, art colleges have expanded existing traditional fine arts programs into interdisciplinary and digital integrated ones (Harwood, 2007). Recent art education studies explore the impact of digital technologies on art students' learning with an emphasis of instrumental perspectives (Grenfell, 2013; Harwood, 2007; Horswill & Novak, 2006; Macko, 1997; Miller & Williams, 2013; Wilks, Cutcher, & Wilks, 2012). As such, art education literature makes efforts to the use of digital technology as a learning tool from the perspective of learners and less explores the artistic process from the professional experience of teaching artists and that related teaching artists' studio art teaching. In regard to the use of Internet technologies from instructional perspectives, Australian art education scholar Janette Grenfell (2013) suggests using Internet technologies to assist art students in their studio art learning in "a virtual socially networked e-learning" space. Grenfell discusses internet aids from the learning environment students' visual journals, and art in E-learning Environments Grenfell uses the example of Second Life, which forms an online virtual community where people become residents and create their own avatars. Second Life was developed in 1999 and introduced to the public in 2003. Grenfell notes that students' technology skills are essential to successfully participating in E-learning environments and further creating collaborations between educators and learners. Another example of integrating Internet technology in studio art teaching and learning is that American art education researchers Wendy Miller and Rachel Marie-Crane Williams (2013) encourage using blogging as an instructional method to help art students extend their reflections on

required assignments beyond the physical classroom. The emphasis on the use of technologies as a tool and media in art classrooms is problematic because digital art creation in a studio course engages not only the use of technologies but both teaching artists' and art students' creative thinking process of realizing students' projects.

In addition to the instructional perspective, the other problematic situation of emphasis on technology as tools, instruments and materials results in media art curriculum design in fine arts programs. For example, the MFA curricula at Parsons New School for Design and Pratt Institute, art schools in the great New York metropolitan, are structured on: studio seminar which emphasize on art students' individual project, studio electives (e.g., skill and knowledge of artistic media), and art theories (e.g., art history and art criticism). Media-design-related programs usually offer many digital art-related courses, while fine arts programs do not. For example, MFA programs in the Department of Digital Arts at Pratt Institute have the following focuses: Digital Animation and Motion Arts, Interactive Arts, and Digital Imaging. In addition to developing art students' projects, learning the latest software (e.g., programming language) and hardware is essential to curricular design.

Australian education researchers Judith Wilks, Alexandra Cutcher, and Susan Wilks (2012) reflect on the integration of "information and communication technologies" (ICT) into teaching in art classrooms. The Australian researchers believe that it is important to emphasize access to digital software and hardware for both teachers and students. They also note that it is important to help students to develop students' critical thinking when they create digital art, in particular Internet art. Although their study finds that it is important to help students' critical thinking in their creative process of digital art, Wilks et al.' study on integration of ICT in the art classroom does not further explore the requirements for creating digital art in addition to computing equipment.

These two problematic situations discussed earlier take this study to explore and decode patterns of the three selected artists' experiences of creating online interactivity

for better understanding the artistic process of online interactivity. Furthermore, how is the artists' professional experience integrated into their studio teaching?

Where digital media artists' creative experiences are a key attribute to studio art teaching as examined in American philosopher Donald Schön's (1983) theory of the reflection-in-action practice in professional fields, this study is interested in linking the three selected digital media art artists' creative experiences of online interactivity and their studio teaching in a reflective process. In addition, this study explores how the three selected digital media art artists encourage their art students' creation of online interactivity, and what kinds of artistic practice can be fostered in their students. This study primarily focuses on conceiving and creating online interactivity in the artistic process, specifically web-based art creation.

While much has been said about the interactions that take place in the final work, digital media artists have suggested that these concerns involve the viewer's specific actions, but are part of the artistic process as well. Interactive web-based art tends to highlight prediction because all interactive web-based art is created through pre-written codes, and lends itself to interactive input. For example, French artist Claude Closky's (1997) early web-based artwork, *Do You Want to Love or Lust?* demonstrates that viewers from all over the world interact with the work by selecting and clicking an answer out of two options. Then, the next question shows up on a new web page after the viewer selects an answer (see Figure 2). Those predictable online interactions are determined by the artist's preprogrammed html codes and Java language. For Closky, interactions in his online artworks are the result of reflecting on contemporary social media. Although the result of working with websites specifically as a medium is that the viewer's interactions would appear to play a central role, the artists consider online interactivity artistically, aesthetically and socially in the ongoing artistic process.

On the other hand, many digital media artists de-emphasize the importance of defining an audience ahead of time, or attempting to imagine the possible responses. If

interactivity in web-based artworks goes beyond the act of merely clicking and selecting, what other elements and processes are artists thinking of and working with? If classical visual art tends to focus on the interaction of the visual experience, what other relations, formal and informal elements are interactive web-based artists considering? What kinds of interactivity are they looking for?

One of the big shifts marked by the move to digital media and then within digital media to the Internet and websites is a change in the materials, components, and techniques that are available and needed. In particular, there is a distinction between tangible objects and visual components (such as screens and keyboards) that are perceived by participants and intangible media (such as programming code and software) that are typically transparent to the experience of the final work. What kinds of technologies and skills are artists working with? And how do they work with them in

Figure 2. Claude Closky. *Do you want love or lust?* (1997)

Note: Screenshot detail. Web project (http://awp.diaart.org/closky/index.php). The home page. Commissioned Internet artwork by the Dia Art Foundation.

relation to interactivity? For example, do they start working with a technology, program, or code, and then discover what kinds of interaction are available? Or, do they start with an idea around interaction and then find or choose the technologies and skills that will allow this to happen? Is it a combination, or do they have other modes of working?

While some interactive digital media artists may work purely with Internet technologies, other artists may situate themselves within a wider range of artistic media, history and practices. The American artist Lynn Hershman Leeson and French artist Claude Closky, for example, work across traditional media and digital media. Closky and Hershman Leeson began to create interactive web-based art from the late 1990s, and have continued until the present. Closky even creates new web-based works every year. Another example is Canadian digital art pioneer Rafael Lozano-Hemmer, who has worked with diverse advanced technologies since the 1990s. In contrast with Hershman Leeson and Closky's artistic path, Amsterdam artist Martine Neddam largely transitioned to Internet technologies in the mid-1990s. Neddam's early artistic practice often involved language and text, installations and sculptures in public space. As such, digital media artists' choices of the media (traditional, digital, software, hardware, etc.) speak to the following research questions: Why do digital media artists choose digital technologies? With this change in the possibilities of interactions due to rapid changes in advanced digital technology, how do artists conceive of online interactivity in their artistic processes? Not only does this raise questions about how digital media artists create and work with the projected interactivity of the viewer, but it also potentially changes their own interactions with their works in progress. When creating interactive works, how do digital media artists describe their artistic processes?

As digital technologies evolve with fast and furious speed in response to the artistic process, the role of online interactivity has shifted in the three selected digital media artists' practices and influences their studio art teaching. The focus of this study, however, is not on curricular implementations, but on developing a better understanding

of the actual working practices of artists who have worked as pioneers in these emerging forms. Rather than simply attempt to extract working methods that can then be applied by art students and teaching artists who are interested in these media, the lessons to be learned might involve thinking about how to work with digital forms, media, and technologies as they emerge, before pedagogies around their use are established.

By emphasizing the artists working processes in the moment, this study speculates, in the conclusion, on possible implications and directions for pedagogic and curricular opportunities, and moreover poses questions for further research and study.

Statement of Purpose

The purpose of this qualitative case study is to describe and discover the role of online interactivity in the artistic process for the field of digital media art and higher art education. Conceiving and creating online interactivity in web-based art is generally defined as part of the creative act in the art-making process.

Based on findings of the role of online interactivity in the artistic process, this study further discloses the dynamic relationship between the three selected digital media artists' experience of online interactivity and their studio pedagogies. This case study aims to learn from the three selected pioneering, and still productive, interactive digital media artists who have teaching experiences in higher art education. As such, this study is organized around a select group of the specific three artists who have worked with the Internet and interactivity and have been actively teaching studio art courses for more than two decades.

Research Questions

The central research question outlines the role of online interactivity in the artistic processes of three digital media pioneers who also teach in universities and museums. How do the three selected digital media artists conceive of online interactivity, and what role does it play in their artistic processes? Subsequently, the research question moves to explore the relationship between the three artists' artistic processes of online interactivity and pedagogies for studio art.

Sub-Questions for the Role of Online Interactivity in the Artistic Process

- What artistic strategies do the three selected digital media pioneers incorporate into their ongoing artistic processes of interactive web-based art?
- What forms of online interactivity might be specific to the three selected digital media artists' practices?
- How do specific artistic techniques, and technologies, skills inform online interactivity in the artistic process?"
- How do the three selected digital media pioneers' situate their interactive web-based work in historical contexts of art?

Sub-Question for Studio Pedagogy in Relation to the Artistic Practice of Online Interactivity

- How do the three artists' practices of online interactivity influence their studio art teaching in higher art education: including pedagogy and instructional strategies?

Assumptions

Not to Be Debated

- In a general sense, all art, including traditional art, is interactive.
- Conceiving interactivity is a part of the artistic process of web-based art.
- Interactivity, websites, and browsers are legitimate artistic media and forms.
- Web-based art is a form of digital media art.
- The processes of working with interactivity in web-based and traditional art forms are different.
- The artistic process is the process of creating, making and producing art.
- There is an historical relationship between different modes of technology and the socio-cultural forms that emerge around them.
- The fundamental authorship of interactive web-based artwork is shared between the artist and the viewer.
- The authorship of an interactive work of Internet art is owned by either the artist or the user.
- The user is a co-creator in Internet art with the artist.
- Interactivity can be taught.

To Be Debated

- Conceiving and producing interactivity in the artistic process of web-based art incorporates complex artistic strategies and various digital technologies.
- Artists make choices of materials and practices based on their interactive intents.
- Conceiving interactivity in the artistic processes of web-based art relates to historical contexts of art.
- Digital media artists' practices of online interactivity influence their studio art teaching.

Limits of the Study

- This study provided a close look at the role of online interactivity in the artistic processes of web-based art. The number of research participants was limited to three. Interviewees' professions were limited to artists who have teaching experience in higher art education and incorporate online interactivity and web browsers into their artistic processes. Inclusion in the study was not limited by gender, age, and cultural background. The three research participants were invited to take part in the research on a voluntary basis.
- This study did not research art students' learning experiences in studio courses. This study focused on the artistic experience of online interactivity and discovered the relationship between the three selected artists' practices of online interactivity related to their studio art teaching in higher art education. As such, interview questions were answered based on the artists' recollection and memories which might be unreliable and also possibly be shaped by later experiences. However, this in itself might provide an interesting lens. And in any case, this also expressed the urgent relevance of probing these experiences in as timely a fashion as possible, before they are lost.
- The interview data was primarily collected through email correspondence and online conferencing with the three selected digital media artists within approximately one in-depth interview. When needed, the research followed up with a second interview to clarify information collected and to pursue threads of data that were needed. The time frame for this electronic interviewing sequence was three months or less, depending on the availability of the artists.
- This study investigated the role of interactivity in the artistic process of web-based art, rather than the viewer's interactive experience in web-based art. Specific finished works might be used as examples but with the aim of

exploring the artistic process behind them, from the artists' perspectives, not the users'.

- I am a practicing artist who works with video installation but less directly with Internet and web-based art work. In addition, because I work with interactivity in other media, my own biases and interests might inflect my questions and how I have interpreted what the artists have to say; however, I was primarily interested in hearing their perspectives, as little is known about this area. My professional experience, age, gender, cultural and racial background might provide a limiting lens to this study.
- As the interviewer, my own positionality presented a limit. Because of the in-depth interview approach, my interpretation of early answers might have affected the direction that further questions took. However, this is often the case in this form of interviewing and in any interactions between multiple positions. This might also lead to the exploration of research directions that the participants might not have arrived at on their own, while also not restricting the interviews to pre-articulated directions that would not be able to adjust to the interviewee's expertise and answers.
- The theoretical framework used in this study consisted of concepts and contexts of digital interactivity and web-based art. I focused on:
    - Digital interactivity: Katja Kwastek, Ryszard Kluszczyński

      European digital art historian Katja Kwastek teaches Modern and Contemporary Art at Vrije Universiteit Amsterdam. In her book *Aesthetics of Interaction in Digital Art* (2013), she argues interactivity and interactions in digital artwork generally from a perspective of the history of art. Kwastek's argument enables this study a historical foundation of interactivity in digital art creation.

      Ryszard Kluszczyński teaches cultural and media studies at Lodz

University, Poland. He examines interactivity in media art from the perceptive of digital forms and media. Kluszczyński's (2010) essay "Strategies of Interactive Art" provides this study to understand features of interactive art.

- Digital technology: Lev Manovich, Jay David Bolter and Richard Grusin

  Lev Manovich is a new media theorist. His writings provide this study the understanding of the evolution and development of technology and digital art making.

  Jay David Bolter and Richard Grusin (1999) co-authored the book *Remediation*, which provides this study with the influence of technology on digital art creation in a broad sense. From a chronological view, Bolter and Grusin argue technological influence on painting, photography, film, television, radio, and computer art.

- The history of Internet art: Christiane Paul, Rachel Greene

  American digital art scholars Christiane Paul and Rachel Greene's studies give a historical overview of digital and Internet art development.

- Reflective practice: Donald Schön

  Donald Schön's theory of reflection-in-action provides this study a rationale and theoretical foundation to explore the relationship between the artists' past experiences and their professional practices. This study employs Schön's theory of refection-in-action to understand the three selected artists' creative practices, and studio teaching experiences.

Chapter II

REVIEW OF LITERATURE

This chapter provides the literature review, which presents a theoretical framework to better elucidate this study's overarching research questions. The literature review in this chapter examines the following subjects: (1) the evolution of digital interactivity in the artistic process, (2) relevant historical contexts in art history, and (3) the relationship between the artist's studio art teaching and their artistic practices themselves itself.

In this chapter, the first section explores the evolution of technology and digital interactivity in the artistic process. The second section further discusses online interactivity and web-based art. The third section connects relevant historical contexts to interactive web-based art. The fourth section addresses the reciprocal relationship between the artist's practice and the transformation of his or her past artistic experiences into studio art teaching.

Digital Interactivity in the Artistic Process

The increasing relationship between creating art and digital technology have stemmed from personal and home computers becoming available to the public in the 1980s and Internet access becoming prevalent globally in the 1990s (Greene, 2004; Kwastek 2013; Lopes, 2010; Paul, 2003). Early computer art can be traced back to the 1970s and has continued to develop until now. The use of digital technologies and computing processes in the artistic process has expanded the array of art forms and media

traditionally used. Digital technologies are now being used in the creation of art, not just as a tool, but also as a medium (Paul, 2003). American digital art historian Christiane Paul (2003) explains the distinction:

> [Art] that uses digital technologies as a tool for the creation of traditional art objects—such as a photograph, print, sculpture, or music—and art that employs these technologies as its very own medium, being produced, stored, and presented exclusively in the digital format and making use of its interactive or participatory features. (p. 8)

Artworks that incorporate digital technologies as media, Paul (2003) suggests are "interactive, participatory, dynamic, and customizable" (p. 67). The final form of different types of interactive artworks is not completed and finalized until the viewer physically participates in a series of "events" (Kluszczyński, 2010; Saltz, 1997). Roger F. Malina, the executive editor of the Leonardo publications at the MIT Press—a long-standing and influential journal of arts, science and technology—distinguishes five qualities of the newly emergent form of digital interactive art, based on computing qualities in the book *Media—Art—History* edited by German researcher Hans-Peter Schwarz at Zentrum für Kunst und Medientechnologie Karlsruhe (ZKM) in 1997. Malina's analysis was derived from selected works in the *Prix Ars Electronica* at ARS Electronica in Austria in 1990,[1] the first year they included interactive artworks. The five computer qualities expressed in interactive digital art, according to Malina, are: (1) the possibility of carrying out interaction in real time, altering the internal status of the computer; (2) the computer's capacity for having learning processes built in so that the internal status of the computer alters while interaction is taking place; (3) the possibility of linking up a computer with another computer over long distances via telecommunication networks; (4) the capability of incorporating and assimilating signals with a multitude of modes, not all of which are accessible to the human senses, and to

[1]The *Prix Ars Electronica* was the first art award given to electronic, animated, and interactive art, given first in 1987 by Ars Electronica, which is a media art institute in Linz, Austria.

link these signals in a sensual, aesthetic way; and (5) the capacity to store vast amounts of information which can then be made easily available.

The emergence of digital media in the arts in the late 1970s and 1980s brought about an emphasis on physical participation as a trigger for changing digital contexts, for example, in the works of pioneers like Myron Krueger and Jeffrey Shaw (Dinkla, 1994; Manovich, 2001). Accordingly, in that time computer artworks were created in the early stages of digital art (Paul, 2003). As such, Paul argues media artists often work with programming and computer-controlled devices as a medium to situate the viewer in an interactive environment. Krueger's early interactive installation presents a responsive environment where somatic elements trigger the computer artwork, as he describes in the essay "Responsive Environments" in 1977 and the book *Artificial Reality* in 1983.

Interactivity in art can be discussed in a more general sense. That is, any artwork, traditional, electronic, or digital, is engaging, participating and interactive (Manovich, 2001; Morse, 2003; Paul, 2003). Interactivity is not a privilege of media art and therefore has various roles in different art contexts (Lopes, 2010). However, there are different interactions between traditional and media art works as Dominic Mclver Lopes and Christiane Paul argue. Lopes distinguishes interactivity in computer artworks from those of traditional artworks such as painting and sculpture by using the terms "computing interactivity" and "prescribed user actions" (pp. 35, 39, 42). As Lopes (2010) writes, "[Interactive] works prescribe that we act to impact the display, and we appreciate them by acting as prescribed" (p. 39).

By comparing the final presentation of finished works, Paul (2003) also differentiates interactivity in traditional and digital art forms:

> [This] interaction remains a mental event in the viewer's mind when it comes to experiencing traditional art forms: the physicality of the painting or sculpture does not change in front of his or her eyes. With regard to digital art, however, interactivity allows different forms of navigating, assembling, or contributing to an artwork that go beyond this purely mental event. (p. 67)

Manovich (2001) discusses interactivity in relation to a new media principal, variability that a new media object "is not something fixed once and for all, but something that can exist in different, potentially in infinite versions" (p. 36). Manovich further describes two structures in media including "branching or menu interactivity" and "hypermedia," which suggest closed and open interactivity (p. 40). Manovich argues:

> In the case of branching interactivity, the user plays an active role in determining the order in which already generated elements are accessed. This is the simplest kind of interactivity; more complex kinds are also possible in which both the elements and the structure of the whole object are either modified or generated on the fly in response to the user's interaction with a program. We can refer to such implementations as *open interactivity* to distinguish them from the *closed interactivity* that uses fixed elements arranged in a fixed branching structure. Open interactivity can be implemented using a variety of approaches, including procedural and object-oriented computer programming, AI, AL, and neural networks. (p. 40)

In addition, Polish media art scholar Ryszard Kluszczyński (2010), in his essay "Strategies of Interactive Art," examines interactivity by analyzing eight strategies of interactive art: instrument, game, archives, labyrinth, rhizome, system, network, and spectacle. The interactions call upon the viewer's participatory initiation, involving various and dynamic factors, according to Kluszczyński. Interactive artworks may involve more than one strategy. Kluszczyński gives the example of interactive artist Rafael Lozano-Hemmer's interactive installations *Vectorial Elevation* (2000) and *Body Movies* (2001), which employ strategies of instrument and that of spectacle in public space. In addition, Kluszczyński suggests that interactivity in Internet art settings touches upon both game and instrument strategies.

According to his concept of strategies of interactive art, Kluszczyński (2010) argues that interactivity in a work of art "takes on the shape of an event" (p. 2). For example, Kluszczyński writes that the "strategy of instrument suggests the audience creating a performance with the use of this interface that becomes a generator of events" (p. 4). In addition, "strategy of game organizes events each time becoming a work of art

evolving around interaction itself," according to Kluszczyński (p. 7). As such, "[an] artist does not make a final, completed piece of art, [but] instead produces an area of activity for the receivers, whose interactive actions bring to life an artwork-event" (p. 2).

Similarly, American media art theorist Margret Morse (2003) examines interactivity in media art through the concept of interface, immersion, and participation. For Morse, traditional forms of art evoke "a one-sided notion of authorship" while interactivity in media artwork "allows the user to alter the final form of the artwork" (pp. 20-21). She suggests that interactivity is defined by decision-making involvements or a user's active participation.

Speaking to the effects that these new media may have within art, British computer artist and researcher Ernest Edmonds indicates, "[the] use of new digital technology may lead to transformation of existing forms and traditional practices" (Edmonds et al., 2005, p. 458). However, interactivity is typically discussed within the framework of the relationship between the viewer and the finished work. In particular, processes of web-based art from the creator's point of view have not been well documented, discussed or developed in the literature to date.

Interface as a Medium in Digital Interactivity

The activation of interactions in digital art requires an interface which functions as a medium between preprogrammed code and the process of interactions. Margret Morse's (2003) argument addresses the importance of interface in the creation of digital interactivity. Morse explains:

> That liaison between mind, body, and machine, between the physical world and the other virtual scene, requires a translator or *interface*, most often hardware that includes a keyboard (or, for instance, a motion sensor or other tracking device), a monitor, and a controller such as a mouse, as well as software programming. One interacts by touching, moving, speaking,

> gesturing, or another corporeal means of producing a sign that can be read and transformed into input by a compute. (p. 19)

Online interfaces function as other representational mediums, for example painting, photography, cinema, television, video (Bolter & Grusin, 1999; Manovich, 2001). Manovich (2001) argues that online interfaces function like traditional painting surfaces supporting paints and stroke. He writes, "Each has its own grammar of actions, each comes with its own metaphors, each offers a particular physical interface" (p. 73).

Furthermore, Manovich (2001) uses the terms "cultural interface" and "human-computer interface" to elucidate a cultural context to discussions on the use of interfaces in the artistic process. The user's interactions, particularly on the Internet, have heavily involved the access of "cultural data—texts, photographs, films, music, virtual environments" since computer-based communication became dominant in the 1990s (p. 70). The user individually, culturally, and socially "interfaces" with code for interactions designed by the artist (Bolter & Grusin, 1999; Manovich, 2001; Morse, 2003). As Paul (2003) suggests, web pages and the Internet are interactive interfaces where global interactions happen nomadically, though navigating, without fixed time and space limits. Interfaces in a web-based artwork shape users' dynamic and unpredictable interactions, which modifies, as a result, the form of online interactivity (Manovich, 2001). Without digital interfaces, interactivity is an unrealized form of code in the artistic process.

Online Media and Interactivity

With the emergence of digital media, and then, within this larger context, of Internet/Web Based/Networked media, questions about the nature and possibilities of interactivity have become important concerns (Paul, 2003; Ziarek, 2004). The essential character of the Internet is interactive: you choose which website to visit by typing and clicking on a screen; leave a message on social networks to communicate with the rest of

the world; search keywords in online search engines and databases for information (Berners-Lee et al., 2010; Ziarek, 2004). In addition, Internet art makes possible the presenting and experiencing of artworks without traditional limits to time and space (Dinkla, 1994).

In the early 1990s, Internet art further expanded the mode of interactions in artworks (Paul, 2003; Ziarek, 2004). More and more artists began to work with the Internet (e.g., email, web cameras, and online conferencing) and the World Wide Web (e.g., web browsers). Krzysztof Ziarek (2004), the author of *The Force of Art*, argues that the use of web interactivity particularly creates "open-ended web work" which "comes to be disclosed as a cooperative venture of mediation, links, and intermediaries, extended in time and virtual space, intrinsically open to intervention and redefinition" (p. 192). Similarly, French researcher Jean-Paul Fourmentraux (2006) believes that "the medium, the source of information and the environment where its 'interactivities' and 'interactions' spread and weave the relationships between the 'agents' [are] involved in the creative process" (p. 49).

In the mid-1990s, the standardization of HTML language led to more dynamic possibilities on websites (animation, video, audio, etc.) (Greene, 2004). As these interactions were taken up by artists, the traditional engagements with works were decoupled from local sites (usually galleries and museums) and the nature of interactivity seems to have shifted toward more personal and private interactions—specific to individual personal computers, monitors, and selection devices—and also toward more globally distributed participation (Paul, 2003).

Web-based interactivity, according to Ziarek (2004), creates "a new form of participation in a work of art," which "[changes] the very notion of participation, further blurring the boundary between creation and reception, turning the Web viewer/visitor into a quasi-artist/engineer"(p. 191). As Ziarek observes, interactivity is realized through a series of events composed of "actions as production, making or manipulation"

(pp. 191-192). Ziarek further comments, web-based art as a "virtual/electronic modality of existence is multiply open to participation, change and turning, which means that such a work is spatially-temporally interactive, flexible, changeable, and multilinked" (p. 193). Ziarek argues, "web-based art works, like the temporality of being, are metamorphic in their character, enacting in its mode of being the interactive, hybrid, and omnilinked operations of modern reality" (p. 193).

Media art literature often suggests that web-based art combines hybrid approaches of software, games, literature and activism in its artistic process (Corby & Baily, 2006; Greene, 2004; Kluszczyński, 2010; Paul, 2003). In discussion of physical interactions in web-based art, artists consider that creation of interactivity in web-based art is more than clicking (Morse, 2003; Paul, 2003). As Morse (2003) argues, "Interactivity is not just an instrument or a perhaps irritating interval between clicking and getting somewhere else but an event that brings corporeal and cognitive awareness to this increasingly ubiquitous feature of the contemporary world" (p. 18).

Much of the emphasis in the media art literature on interactivity in Internet art is on the finished work. For example, American Internet art theorist Rachel Greene's (2004) book *Internet Art* presents an overview of Internet art through an analysis of forms, technologies and themes. Lopes (2010) surveys computer art through investigating computer artworks' form, presentation, materials and interactions in his book, *A Philosophy of Computer*. Despite this emphasis on interactivity, relatively little has been written about how the artist understands the changing interactive possibility in their work. However, interviews with Internet artists and critics suggest that the artists consider interactivity to be a much broader concern that influences their creative process. For example, when asked about interactivity, Internet artists tend to discuss how they envision it in relation to the artistic process (Baumgärtel, 1999; Kelsey, 2002). With regard to the creator's process, the British artists Gavin Baily and Tom Corby (2006), who work collectively, illustrate their network *Reconnoitre* created from 1997 to 1999,

which engaged a process of interconnecting with other elements, and then that of evolving forms. Baily and Corby say:

> Work emerges discursively; both in a literal sense as an ongoing making and reflective activity and through contact with other disciplines, ideas, the public and curators, etc. Making is a relational activity, a 'kludging' together of code and interface fragments, ideas and models borrowed from other disciplines. These components jostle and interface to drive development for forward; the final project is always different from its initial aims. (p. 119)

In regard to the use of digital technology in the artistic process, some media art theorists see this process of algorithm development as distinguished from the traditional process of tactile media, which may apply to explore online creation of interactions. Regarding authorship, American researchers Jay David Bolter and Richard Grusin (1999) describe computing methods as a transparent process. By using digital technologies, creators embody an idea through physical activities that do not show themselves, like a brushstroke might, in the work itself (Bolter & Grusin, 1999; Manovich, 2001). Physical activities in Internet art include moving and clicking a mouse for selecting options, and typing texts and codes on a flat screen. In addition, Manovich (2001) calls this digital process a "soft" procedure due to the separation of computing devices and applications, as well as the representation of binary code systems on a computer. While perhaps transparent, Manovich further suggests that working with computer data as a series of operations of "selection, compositing, and teleaction" are a way to understand the world, rooted in new media processes of numerical representation, modularity, automation, variability, and transcoding (pp. 18-55, 118). Manovich's general statement regarding digital processes also applies to Internet art.

Web-based art in the early 1990s, due to the technological limits of HTML, often worked with simple text and graphics (Paul, 2003). According to Greene (2004), early web-based artwork in the late 1990s was engaged with "low-fi net production tools," for example HTML, ASCII, and digital image editing software, and later, Java, Flash, and Dynamic HTML were added (p. 33). In addition to HTML, some artists used American

Standard Code for Information Interchange (ASC II) to create digital images from alphabetic and numeric character (Greene; Paul). For example, Slovenian Internet artist Vuk Ćosić worked together with European artists Luka Frelih and Walter van der Cruijsen to create a series of ASC II "pairings" called *Deep ASCII* (1998). As Greene notes, in *Deep ASCII*, the artists transformed an American pornographic film *Deep Throat* (1972) into a graphic image of ASC II computing texts on Pong video game hardware.[2] With regard to art form and subject matters, Greene argues that in *Deep Throat* the artists represent an old pornography film in a "green-and-black, pixelated appearance [which] recall the game's graphic interface" (p. 90). Although Greene explores the artistic effect of text-based programming languages in a work, the artists' conceptual motivation of using Internet technology seems not to be fully realized.

As such, British artists Baily and Corby's (2006) statement of five positions in their practice of Internet art may provide another lens for a closer look at the artists' thoughts about the use of Internet technology. Baily and Corby declare: (1) technology is not merely instrumental; (2) networks induce hybrid practice; (3) software is organic matter; (4) software is political; and (5) technology is productive agency and cultural irritant (pp. 109-110). Furthermore, Baily and Corby argue that "software and networks are organic matter that should be seen as part of a continuum with the material world and not separate from it" (p. 110). Indeed, Baily and Corby's statement adds weight to the argument that the artists' own accounts provide better understanding of their own reasons for conceiving and using online interactivity in the artistic process.

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[2]American computer scientist Allan Alcorn developed the video game Pong in 1972, which later was released by Atdutchri corporations. Pong had great success in the 1970s. According to the Pong Game website (http://www.ponggame.org), Pong is a "simple 'tennis like' game features two paddles and a ball. [The] goal is to defeat your opponent by being the first one to gain 10 point, [and] a player gets a point once the opponent misses a ball."

The Context of Art History for Online Interactivity

The literature in the media art field tends to reference connections to a larger context of critical theories (Greene, 2000, 2004; Paul, 2003). Greene (2004) argues that there remains a need for further in-depth examination of art historical perspectives. She writes:

> Though Internet art has been discussed in a number of books and catalogues that have appeared since the mid-1990s, and a handful of net art archives are available online, the connections between net art and other art-historical movements are not well documented. In part, this may be due to the specialization of many net art critics and writers, whose methodologies are often grounded in internet culture and whose audiences remain mostly online. Their experience, useful as it is, does not always lend itself to sustained critical explorations of the relation between net art and such groups, movements and art forms as Fluxus, EAT (Experiments in Art and Technology), Happenings and multimedia art spectacles of the 1960s through to the present, as well as developments in cable and video. (p. 19)

Additionally, the literature on media art often emphasizes the origin of interactive art from art historical perspectives by examining the relationship between the legacy of avant-garde art movements and forms of interactive art. Most media art theorists observe strong connections between digital interactive art and certain artistic movements of the twentieth century, such as Dada, happenings, Fluxus, and Conceptual art (Corby & Baily, 2006; Greene, 2004; Kwastek, 2013; Paul, 2003). However, how the artist relates the concepts of these historic precedents to their practices of online interactivity has not yet fully examined. For example, Greene asserts that Internet art evolved from conceptual art "through its emphasis on audience interaction, transfer of information and use of networks, simultaneously by passing the autonomous status traditionally ascribed to art objects" (p. 10). By analyzing the formal elements of Internet art, Greene's argument for the relationship between art historical precedents and Internet art provides preliminary information. This study, unlike most media art literature focusing on the final art production of online interactivity, further aims to explore the following questions from the creator's perspective: What specific concepts of these early art movements do the

three selected artists appropriate for the creation of interactive web-based art? How do the three selected artists' concepts of online interactivity relate to specific artistic historical ideas? How do the three selected artists articulate the influence from the history of art?

The Reflective Practice in Studio Art Teaching

The ultimate purpose of this study is to inquire into the transformation of artistic experiences into studio art teaching in higher art education. As such, the earlier sections which explored components of technology and interactivity from the perspectives of media art history and criticism provided an understanding of digital interactivity in the creative process and enabled this study to further examine the connection to studio art teaching in higher art education. This section uses Donald Schön's (1983) theory of reflection-in-action as a fundamental theoretical framework to underpin this reflective relationship between the artistic practice and studio teaching. Schön's study on a master teacher's teaching in a design studio provides a rationale for this study to explore the three selected artists' artistic experiences and their studio teaching. In addition, this section reviews the relevant literature of art education to address the connections between Schön's theory of reflection-in-action and studio art teaching in higher art education.

Art educators usually simultaneously maintain their own professional artistic practice, in particular those who teach studio-based courses in art colleges (Harwood, 2007; Macko, 1997; Walker, 2004). In art colleges, artists often teach studio courses which are relevant to their professional experiences (Harwood, 2007). This relationship between professional artists' practices and their teaching usually presents dynamic interactions. As such, defining what it is that artists work and teach indeed reflects the changing time and culture of their artistic approaches and educational strategies (Harwood, 2007; Ritchie, 1966; Singerman, 1999). For example, as there is a growing

interest in art and technology in the art world, American art educator Eve Harwood (2007) identifies the relationships among studio art teaching, advanced technology, and the artist's practice in the twenty-first century. She argues, "Advances in technology have transformed the way artists work, and consequently the way they teach" (p. 319). Harwood's observation reveals that technology has a strong impact on art creating, teaching, and learning in higher art education.

The goal of studio courses is generally to enhance art students' creative processes (Barrett, 1988; Heywood, 2009; Walker, 2004). American art educator Sydney Walker (2004) articulates that the art-making process has "no right answers" and involves "big ideas, personal connections, knowledge, artmaking problems, and boundaries" (pp. 6, 10). As such, studio courses are not taught in a traditional classroom but a teaching studio where art students develop creative ideas and projects, make art, and talk about their completed or ongoing projects (Barrett, 1988; Heywood, 2009). As British art education researcher Ian Heywood (2009) further argues, the primary activity of teaching and learning in a teaching studio involves "an extended, often intensely experienced process of making" (p. 195).

According to Schön (1983), each art student's project is a "unique case." In order to facilitate art students' unique making processes, problem-based critique often centers in studio teaching (Barrett, 1988; Harwood, 2007; Schön, 1983). As Walker (2004) notes, critique between art educators and art students continues to evolve in an open-ended situation of creating art. Moreover, in this ongoing open dialogic process, the role of a teaching artist who represents authority identifies problems in the students' creative processes (James, 1996; Schön, 1983). American art educator Patricia James's (1996) study on studio teaching and learning in a sculpture class suggests that "the professor had an important role in the student's working process through his instruction, modeling, and feedback" and "showed characteristics of what he considered to be artistic by pointing to the domain of art and implying that art is both knowable and ineffable" (p. 155).

Moreover, the professor "carefully structured each student's critique to elicit student comments and then present an overview" (p. 154), according to James's observations. Similarly, Schön's (1983) study on the design process in schools of architecture shows that a master teacher reviews and facilitates his student's project. Harwood (2007) asserts that teaching artists "act as coaches and mentors" who "deliver summative judgments about the quality of student work" in a studio environment (p. 320).

In regard to studio teaching in art colleges, studio visits and studio critique are primary teaching activities in studio classes. A studio environment is not a traditional classroom setting. In a studio space, teaching artists often primarily lead and participate in delivering comments on art students' ongoing creative projects, including art students' concept, materials, and forms. In order to provide possible solutions for realizing the students' projects, teaching artists' past artistic experiences are involved in conversational exchanges, which Schön (1983) defines as the process of reflection-in-action. These discussions on reflective practice, which Schön discusses, add weight to the argument that digital media artists bring their artistic experiences of online interactivity to the concepts of studio teaching.

The literature generally argues that studio critiques often engage using and selecting materials in the student's working process (James, 1996; Schön & Bennett, 1996; Walker, 2004; Yanow & Tsoukas, 2009). For example, James (1996) argues that the way a sculpture professor's studio teaching explored materials and forms "informed the way students constructed and interpreted their work" (p. 156). Similarly, Schön argues that a master teacher guides a conversation between the material situation and the student's project in the designing process. Schön (1983) uses the term "the materials of a situation" to suggest the practitioner's reflective conversation with explorations of materials in a designing process in a studio class (pp. 76-78). As Schön believes, "A designer makes things. Sometimes he makes the final product; more often, he makes a representation—a plan, program, or image—of an artifact to be constructed by others. He

works in particular situations, uses particular materials, and employs a distinctive medium and language" (pp. 78-79). The practitioner's reflective conversation with materials, as Schön notes, "is in a kind of progressive relationship—as she goes along, she is making judgments. Sometimes the designer's judgments have the intimacy of a conversational relationship, where she is getting some response back from the medium" (Schön & Bennett, 1996, para. 18).

In regard to instructional approaches, studio critiques often employ conversations about the student's proposed, ongoing, and completed work between art educators and art students (Harwood, 2007; James, 1996; Schön, 1983). In order to facilitate individual students' creative processes, interactive dialogue is one of primary key components to the critique process in studio teaching (Harwood, 2007; Schön, 1983; Yanow & Tsoukas, 2009). An art educator engages a continuation of interactive and reflective conversations with art students and their unique individual projects (Harwood, 2007; Walker, 2004). According to Schön (1983), a reflective conversation in problem-based circumstances addresses a process of reflection-in-action which engages reframing, appreciating, and reappreciating uncertain problems (pp. 128-136). He articulates the process of reflection-in-action:

> In each instance, the practitioner allows himself to experience surprise, puzzlement, or confusion in a situation which he finds uncertain or unique. He reflects on the phenomena before him, and on the prior understandings which have been implicit in his behavior. He carries out an experiment which serves to generate both a new understanding of the phenomena and a change in the situation. (p. 68)

Schön's description above suggests that the process of reflection-in-action works through "uncertainty, instability, uniqueness, and value conflict" (p. 50). Similarly, Harwood's (2007) account of the structure of studio critique responds to Schön's reflection-in-action that studio critique involves reflective conversations. Harwood argues that studio critique usually engages "an introduction, close examination of an artwork,

clarification questions and dialogue based on the act of looking, and a reiteration of salient points" (p. 321).

In this reflection-in-action process, teaching artists integrate their professional experience into studio teaching, including their own artistic experience, professional knowledge, and past training (Harwood, 2007; James, 1996; Schön, 1983; Walker, 2004; Yanow & Tsoukas, 2009). Schön (1983) explains that in reflection-in-action, "a practitioner's repertoire includes the whole of his experience insofar as it is accessible to him for understanding and action" (p. 138). Additionally, Dvora Yanow and Haridimos Tsoukas's (2009) study suggests that teaching artists are able to identify and deal with unfamiliar problematic situations in students' artistic projects based on teaching artists' professional artistic experiences. Furthermore, in the process of reflection-in-action, a practitioner spontaneously "[engages] in instant historical revisionism" of their past experiences (Schön, 1983, p. 140). Schön explains:

> It is our capacity to see unfamiliar situations as familiar ones, and to do in the former as we have done in the latter, that enables us to bring our past experience to bear on the unique case. It is our capacity to see-as and do-as that allows us to have a feel for problems that do not fit existing rules. (p. 140)

Schön (1983) suggests that historical revisionism recalls one's past experiences for solutions in the process of reflection-in-action. As such, teaching artists' past creative experiences are essential to the mentoring experience in studio teaching (Harwood, 2007; Schön, 1983; Walker, 2004; Yanow & Tsoukas, 2009). Many studies on studio art teaching and learning have investigated educational approaches and studio activities in instructional situations. Most literature of art education emphasizes the technological influence on instructional strategies, implementations, and art students' learning experiences (Barrett, 1988; Harwood, 2007; Heywood, 2009; Macko, 1997; Walker, 2004). However, how teaching artists transform their experience into pedagogy remains largely unexplored in the literature of higher art education.

Chapter III

METHODOLOGY

This chapter discusses this study's research design and methods. This qualitative case study was "particularistic, descriptive, and heuristic," as American adult education scholar Sharan B. Merriam (2009) suggests (p. 43). This case study is intended as the initial research to better understand the role of online interactivity in the artistic process. This study selected three digital media artists who began to incorporate digital technologies and web browsers into their artistic creation during the advent of web art in the 1990s and who also continued their explorations of interactivity in web-based artworks into the present day.

The purpose of this qualitative research study is to explore the influence of digital technology and online interactivity in the three selected digital media artists' artistic processes and the relationship between their artistic practices and reflections in teaching media-related studio courses. Furthermore, the study aspires to develop more relevant analytical and critical approaches to educational strategies for teaching digital media art in higher education.

Setting

This research study primarily employed the in-depth electronic interview method for data collection as a reflection of the three selected digital media artists' online interactivity practices and more fluid and global communication media through the

Internet (Paul, 2003). Electronic interviews were primarily conducted via email and online conferences. The selection of which digital media artists to include in this study was likewise a reflection of the globally dispersed setting of web-based art, with the selected artists working and living in New York, San Francisco, Montreal, and Amsterdam.

Participants

The participating digital media artists for this case study were selected according to a method of criterion sampling based on the purposeful sampling approach detailed by American educational psychology researcher John Creswell (2013, pp. 145-177) and Merriam (2009, pp. 77-81), along with the theory of sampling triangulation, as elaborated by German psychologist and sociologist Uwe Flick (2009) in his book, *An Introduction to Qualitative Research*.

Purposeful sampling, as Merriam (2009) describes it, is the method of non-probability sampling "based on the assumption that the investigator wants to discover, understand, and gain insight and therefore must select a sample from which the most can be learned" (p. 77). Furthermore, Merriam states that purposeful sampling usually occurs before the data is gathered, and includes two features:

> Purposeful sampling as outlined earlier is used to select the sample within the case, just as it is used to select the case itself. However, a second set of criteria is usually needed to purposefully select whom to interview, what to observe, and which documents to analyze. (p. 82)

By adopting Merriam's concept of purposeful sampling, the three selected digital media artists in this study have teaching experience in higher art education and have continued their artistic practices of online interactivity since the late 1900s.

In addition, this study employed purposeful sampling strategies for case studies which "employ maximum variation as a sampling strategy to represent diverse cases and

to fully describe multiple perspectives about the cases" (Creswell, 2013, p. 156). The three selected digital media artists in this study showed diverse approaches of conceiving and using online interactivity in their artistic processes. Lynn Hershman Leeson works with online artificial intelligence and diverse traditional and digital media forms including film, images, sculpture, drawing and digital technology. Rafael Lozano-Hemmer focuses on large architectural installations and applications on computing devices. Martine Neddam creates virtual characters and software through Internet browsers.

This study included the selected digital media artists' early and recent web-based art projects. The participating artists' early interactive Internet art practices in the late 1990s are emphasized as important contributions to the early development of Internet art in the literature (Greene, 2000, 2004). The selected particular early web-based artworks provided an additional focus. The participating digital media artists' particular early and recent artworks represent various strategies and processes of conceiving and using interactivity in creating web-based artworks. This purposeful criterion sampling of individual digital media artists who have worked with online interactivity and web browsers responds directly to the main question of the role of online interactivity in the artistic process of web-based art.

In addition to the purposeful method of selecting cases, I adopted American communication researcher Norman K. Denzin's (1970) idea of triangulating data sources. In his book, *The Research Act*, he suggests data triangulation can aid researchers with an efficient mode of using the same methods to "maximum theoretical advantage" (p. 301). Denzin writes, "By selecting dissimilar settings in a systematic fashion, investigators can discover what their concepts (as designators of units in reality) have in common across settings. Similarly, the unique features of these concepts will be discovered in their situated context" (p. 301). Flick (2009) defines data triangulation as a research strategy using hybrid multiple data resources. Flick further extends Denzin's (1970) triangulation

to sampling triangulation. Based on the idea of sampling triangulation, this study selected three digital media artists as a final working sample. The three selected digital media artists were not limited by national and geographical boundaries, so the selection of artists also demonstrates that web-based artworks create global communication (Paul, 2003).

Type of Study

This study employed qualitative case study research to understand the role of online interactivity in the three selected digital media artists' artistic processes, and later explored their reflective practices in studio teaching. Norman K. Denzin and Yvonna S. Lincoln (2013) define qualitative research "as a set of multiple interpretive activities, privileges no single methodological practice over another" (p. 6). Merriam (2009) suggests that "a case study is an intensive, holistic description and analysis of a single, bounded unit" (p. 203). According to Merriam, a case study is "an empirical inquiry that investigates a contemporary phenomenon within its real-life context," (p. 40). The investigative goal of qualitative research in this study was to better understand the role of online interactivity in the three selected artists' creative processes from their direct voices.

The sample structure of this research study was dictated by the research questions. "A bounded system" (cases) in this study, in Merriam's (2009) term, was determined by the artists' creative processes involving online interactivity and web browsers.

This qualitative case study research was multicase. Three digital media artists were selected according to the purposeful sampling strategies described in the earlier section. For data collection, this qualitative case study research employed interview approaches via email and online conference. The use of Internet technologies in this study was "as the means of communication between interviewer and interviewee (Bampton, Cowton, &

Downs, 2013, p. 331). To collect data, I conducted interviews in the English language. The three selected digital media artists were proficient in English.

My observer activities were not known directly to the three selected digital media artists as participants in this study. As a passive observer researcher, I was not involved in the three selected digital media artists' artistic processes of creating interactive artworks.

As an interview researcher, my role in this qualitative case study research, as in accordance with Merriam's (2009) theory was to be "the primary instrument of data collection and analysis" (p. 14). As an interview researcher, I was my own research tool (Kvale & Brinkmann, 2009, p. 134). I conducted a series of open-ended and in-depth interviews with the three selected digital media artists about the role of online interactivity in their artistic processes.

Data Collection

For data collection, online interviewing such as email (textual data), and online conference (verbal data), was used in this study (Flick, 2009; Merriam, 2009). The two methods of data collection in this study were in-depth and episodic interview. This research study did not emphasize the finished works but rather the selected artists' creative processes. Email interviews with Lynn Hershman Leeson included two back-and-forth communications. I conducted virtual meetings via Skype with Rafael Lozano-Hemmer and Martine Neddam. The length of each Skype interview was approximately two hours. All interview data was collected within three months.

The interviewees' email responses in this study were not modified, except to fix spelling errors. All interviews via online conferencing were recorded and transcribed verbatim in order to build "the best database" for close examination and analysis (Merriam, 2013, p. 110).

The purpose of the in-depth and episodic interviews in this study was to investigate the artists' direct voices as the-primary data about their artistic processes of online interactivity. American scholar Irving Seidman (2013) describes the primary feature of the in-depth interview as "an interest in understanding the lived experience of other people and the meaning they make of that experience" (p. 9). What a researcher does in the in-depth interview method, as Seidman points out, "is to present the experience of the people he or she interviews in compelling enough detail and in sufficient depth that those who read the study can connect to that experience, learn how it is constituted and deepen their understanding of the issues it reflects" (p. 54).

This study also incorporated the episodic interview, which combines features of the semi-structured interview and the narrative interview. As a qualitative researcher, I used "the interviewee's competence to present experiences in their course and context as narratives" (Flick, 2009, p. 190). As Flick describes, the episodic interview "starts episodic-situational forms of experiential knowledge" and "yields context-related presentations in the form of a narrative" (pp. 185-186). The episodic interview, as utilized in this study, provided access to the selected digital art artists' own voices about the role of online interactivity in their artistic processes.

Following Flick's (2009) method of the episodic interview, interview data collection in this study proceeded as follows. In the first stage, I contacted the three selected digital media artists individually via email and asked if the artist would like to participate in my qualitative research study regarding the role of interactivity in the artistic processes of web-based art. In this email invitation, I explained the main research question in this qualitative case study (e.g., "I will ask you repeatedly about your artistic process in relation to your interactive web-based artworks created from the 1990s to the recent years in general, or specific situations you may suggest"). In addition, I asked whether the participating artist would prefer to meet via email or Skype. I then followed by explaining to the interviewees the time frame involved within three continual months

(e.g., “How long this interview will be conducted?”). I sent the participating artist Informed Consent and Participant’s Rights Forms along with the email invitation (see Appendix C & D).

In order to conduct in-depth interviews with the artists, I further developed interview questions probing the interviewees’ subjective definitions and experiences of working with online interactivity in their artistic processes (e.g., “What does interactivity mean for you in your art-making? What do you associate with the word *interactivity*?”).

As Flick (2009) suggests, I continued to ask for “abstractive relations” in the interviewees’ responses to their past experiences (e.g., “What influence did technology have on your early artistic process? How can you recount about the relationship between your studio teaching and your creation of interactive web-based artwork?”) (p. 187).

In addition to interviewing the artists via online conference, email interviews benefited data collection in this study by allowing the interviews to expand over time and space. For example, because emails were exchanged over a period of three months, the artist was able to answer questions based on their schedules, to have time to find information about interview questions, and to continue to follow up on questions (McCoyd & Kerson, 2006). The nature of email interviewing involves spatial displacement and asynchronousity (Bampton et al., 2013; McCoyd & Kerson, 2006). The advantage of the e-interview’s real-time delay allows the interviewees time to find information and respond to questions in a situation of spatial displacement (Bampton et al., 2013). American researchers Judith McCoyd and Toba Kerson (2006) also indicate some advantages of email interviewing: “extensive, longitudinal communication; allows respondents to complete the interview at their convenience; written text responses; less social pressure; few visual cues to create judgment; geographical differences in experience are revealed” (pp. 396-397). Likewise, a written textual format of communication like email allows interviewees to present information in the ways they choose while also reducing interpretation error (Bampton et al., 2013).

Interviews in this study were guided by an interview protocol, which followed a semi-structured type of interview (Kvale & Brinkmann, 2009) (see Appendix A). As European researcher Steinar Kvale and Svend Brinkmann suggest, a semi-structured interview "[includes] an outline of topics to be covered, with suggested questions" (p. 130). The semi-structured interview explores new knowledge in a flexible and fluid way, as Merriam (2009) indicates:

> The largest part of the interview is guided by a list of questions or issues to be explored, and neither the exact wording nor the order of the questions is determined ahead of time. This format allows the researcher to respond to the situation at hand, to the emerging worldview of the respondent, and to new ideas on the topic. (p. 90)

The interview script in this study appropriated Merriam's (2009) and Kvale and Brinkmann's (2009) suggestion of translating research questions for incorporating interpretative and hypothetical questions into interview questions. In addition, this script was introduced by "open questions" (e.g., "What do you think?") to quote Flick (2009, p. 156). Then the script combined theory-driven and hypotheses-directed questions based on "the researcher's theoretical presuppositions" (p. 153), according to Flick, which "[makes] the interviewees' implicit knowledge more explicit" (p. 153). The interviews in this study thus focused on the artists' reflections of their artistic and pedagogical experiences of online interactivity.

Data Analysis

This qualitative case study collected in-depth interview data directly from three selected digital media artists so as to provide a rich ground to understand the role of online interactivity in the artistic process, as well as the relationship between their artistic practices and studio teaching. As the primary concern of data analysis was to convey an understanding of the case, qualitative data analysis in this study mostly engaged an inductive and comparative process (Merriam, 2009). As Merriam suggests, this study

went through two stages of data analysis, including within-case analysis and cross-case analysis, based on the approach of multiple case studies. This study began with within-case analysis of the collected interview data including email interview responses and verbatim transcripts of recorded online interviews. This research, then progressed into cross-case analysis.

I began data analysis by open coding these interview transcripts, as Merriam (2009) suggests. In order to build codes from data, I employ In Vivo coding to analyze the interview data. According to American theatre artist and qualitative researcher Johnny Saldaña's (2009) account, "Using In Vivo coding to keep the data rooted in the participant's own language" (p. 6). In addition, In Vivo codes identified the three selected digital media artists' patterns of conceiving and creating online interactivity in their "actual language found in the qualitative data record" (p. 74). Furthermore, In Vivo codes provided this study a close examination of data and produced terminology (Strauss, 1987).

My coding scheme was based on the conceptual frame of this qualitative case study's guiding research questions (Merriam, 2009). The two primary coding themes were the role of online interactivity in the participating digital media artists' artistic processes and their teaching experiences in response to the main research questions described in Chapter I. The coding theme of the role of online interactivity in the artists' artistic processes encompassed the following sub-themes: (1) artistic strategies, (2) forms of online interactivity, (3) required technologies, and (4) artistic historical contexts. The coding theme of the artists' teaching experiences consisted of teaching conception and instructional strategies.

The within-case analysis in this study provided an independent and close examination of each selected digital media artists' artistic processes of online interactivity and teaching experiences. The procedure of within-case analysis is, as Merriam (2009) suggests, that "each case is first treated as a comprehensive case in and

of itself. Data are gathered so the researcher can learn as much about the contextual variables as possible that might have a bearing on the case" (p. 204). This initial stage of data analysis provided rich data to understand both the main and sub-research questions. Later, this qualitative case study research moved the analysis strategy to the next stage, cross-case analysis.

In the cross-case analysis process, "a qualitative inductive, multicase study seeks to build abstractions across cases," as Merriam (2009) notes (p. 204). Furthermore, Merriam argues that the result of cross-case analysis might be: "a unified description, categories, themes, or typologies that conceptualize the data or substantive theory offering an integrated framework covering all cases" (p. 204). This study used cross-case analysis to seek interpretations and understandings of the role of online interactivity in the three participating digital media artists' artistic processes and connections of their artistic practices to studio teaching.

Chapter IV

CONTEXT OF THE CASES

The purpose of this chapter is to describe the context of this qualitative case study's participants, and thereby to introduce the participating digital media artists' training backgrounds and the development of their artistic practices, and their teaching experiences. For the purposes of this study, as per the purposeful sampling strategies described in Chapter III, the participants have worked with digital media, with a focus on the Internet and online web browsers since the mid- to late-1990s when the Web was in the early stages of its public access and information deployment. This study focuses on their continuous artistic practices with online interactivity and the Internet, based on the idea that these foundational works are essential for understanding later developments. In addition, the participants all have teaching experience in higher art education. Due to the nature of this case study, the participating digital media artists' responses to interview questions and their artwork details reveal their personal identifying information.

The participating digital media artists are American artist Lynn Hershman Leeson, Canadian artist Rafael Lozano-Hemmer, and French artist Martine Neddam. The three digital media artists have travelled worldwide for their art activities and projects.

This chapter is presented in two sections. The first section illustrates the participating digital media artists' basic demographic information and their teaching experiences which were collected from the artists' websites and interview data. The second section portrays each participant's artistic practices of online interactivity.

Demographic Information

The participating digital media artists work and live in different cities in Northern America and in Continental Europe. The various residing and work locations of each participating digital media artist echo global Internet users who experience and interact with web-based works all times and places, as an Internet connection is available on a computing device.

The digital media participants in this study received different professional training, and in a variety of disciplines. Hershman Leeson completed undergraduate majors in art education, museum administration, and fine arts and graduate study in art criticism. Lozano-Hemmer completed no formal art training programs, but rather chemistry and engineering college majors. Neddam built her artistic practice in linguistics and literature. Appendix E presents demographic information related to this study's research questions, for example age, educational background, primary working media. But I wish to emphasize that the participating digital media artists came from different academic disciplines.

Lynn Hershman Leeson was born in 1941 and works in San Francisco and New York. She teaches in San Francisco and also travels for her artistic projects and exhibitions. Hershman Leeson received the title of Emeritus Professor from the University of California-Davis and A.D. White Professor at Cornell University in the United States.

Rafael Lozano-Hemmer was born in Mexico City in 1967 and received his undergraduate education in Montreal. His studio is based in Montreal, but he teaches internationally. Lozano-Hemmer holds a teaching position at the Graduate School of Design at Harvard University and has lectured worldwide, including at Goldsmiths College, the Bartlett School, Princeton, UC Berkeley, Cooper Union, USC, MIT MediaLab, Guggenheim Museum, LA MOCA, Netherlands Architecture Institute,

Cornell, UPenn, SCAD, Danish Architecture Cente, CCA in Montreal, ICA in London and the Art Institute of Chicago. His works are presented across Europe, Asia, and America.

Martine Neddam was born in 1953 and received her training in Linguistics and Literature at University of Lyon, Stage Design at School of Architecture in Lyon, and Visual Arts Institut des Hautes Études en Arts Plastiques in Paris. Neddam currently works and teaches in Amsterdam. From 1994 to the present, she has held a professorship at Teacher Beeldende Kunst, Amsterdam, Netherlands. In 2008, she was invited as Visiting Professor to the Université du Québec à Montréal (UQAM), Canada. During this residency at UQAM in Montréal, she taught seminars on Internet art and virtual characters. Neddam's recent seminar course, in 2013, at École de Beaux-Arts d'Avignon, France, emphasized identity and virtual characters.

Artistic Practices

In this section, each respective digital media artist is introduced by the development of their practice of Internet art in general, followed by their early and recent interactive web-based artworks which are relevant to this qualitative case study. These selected works were created more than a decade apart.

This study highlights the early work of each digital media artist, roughly from 1996 to 1999, being that this was the first decade of public access to the Web. Their early web-based works helped this study illuminating how the three selected digital media artists began to work with online interactivity in relation to networked technologies, and in understanding their original thinking and processes in response to this emerging media.

In addition, this study investigates their recent practices in order to discover how the three selected digital media artists conceive and create online interactivity with the latest technological developments. Furthermore, this study examines the relationship

between the three selected digital media artists' practices of interactive web-based art and their studio art teaching in higher art education.

Lynn Hershman Leeson

Lynn Hershman Leeson's aesthetic interest lies in identity and gender issues, and is explored through surveillance and media culture, and the relationship between humans and machines. She is interested in human interactivity surrounded by these larger cultural-political contexts. She works with diverse media including performance, film, video, photography, drawing, collage, text-based work, digital technologies, the Internet and artificial intelligence. Hershman Leeson has worked with interactive works from the 1970s until now. She began creating interactive networked artworks in 1995. *The Difference Engine #3* (1995-1998) was created at the Zentrum fur Kunst und Medientechnologie (ZKM) in Germany in 1998. During the time when Internet art germinated in the mid-1990, *The Difference Engine #3* was composed of a networked telerobotic combining online virtual environment and the physical site at ZKM.

Selected early and recent works: *Agent Ruby* (1998-2002) and *Weibel-/Manning-Bot* (2013–2014). *Agent Ruby* is a web-based interactive artwork which utilizes a customized artificial intelligence program (see Figures 3 & 4). Hershman Leeson worked with programmers to realize it. Dr. Richard Wallace developed the online artificial intelligence program specially for *Agent Ruby* (L. Hershman Leeson, personal communication, November 2015). Ruby speaks English. The website visitor can chat with Agent Ruby online in a browser. Alternatively, the user in Hershman Leeson's works can download the software online and chat with this computer character Ruby, who appears on the viewer's personal computer desktop.

By utilizing artificial intelligence, Ruby can remember the user's questions and even learn new vocabulary. Hershman Leeson created moods for Ruby's expression to

Figure 3. Lynn Hershman Leeson. *Agent Ruby*, 1999-2002

Note: Screenshot detail of the opening web page. Web project (www.agentruby.net). The entry page. Collection SFMOMA, Gift of Bitforms gallery, Paule Anglim Gallery, and the artist; commissioned by the San Francisco Museum of Modern Art. © Lynn Hershman Leeson

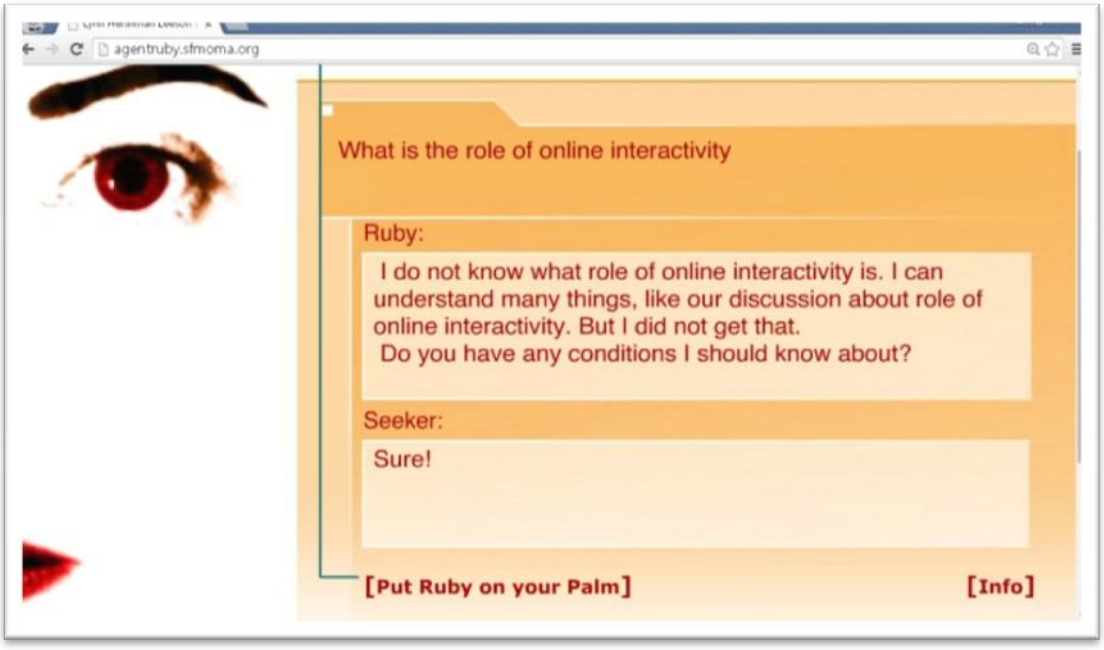

Figure 4. Lynn Hershman Leeson. *Agent Ruby*. 1999-2002

Note: Screenshot detail. Web project (www.agentruby.net). Collection SFMOMA, Gift of Bitforms gallery, Paule Anglim Gallery, and the artist; commissioned by the San Francisco Museum of Modern Art. © Lynn Hershman Leeson

reflect the speed of online transmission. Ruby's virtual face was based on the artist's own facial figures. As Hershman Leeson describes, Ruby is "[an] artificial intelligent web agent that is shaped by and reflective of encounters and adventures that it has with users, and will be seeded to user servers through a site of origin or birth" (Hershman Leeson, artist website). This work is still live on the San Francisco Museum of Modern Art (SFMOMA)'s server.[1]

Nearly fifteen years later, ZKM invited Hershman Leeson to create an online work. Based on her artistic experience of realizing *Agent Ruby*, Hershman Leeson made a new online chatbot work *Weibel-/Manning-Bot*, which has two characters, including the ZKM director Peter Weibel and USA solider Chelsea Manning (see Figures 5 & 6).

The website visitor, on their computing devices, can choose to talk with the Weibel or Manning chatbots. The two chatbots are able to speak English, German, and French. The Weibel chatbot's responses are generated from Peter Weibel's blog. Users can visit a English language website for the Weibel chatbot.[2] In addition, user can have a conversation with the Manning chatbot on the English language website.[3]

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[1]http://agentruby.sfmoma.org

[2]http://aoys.zkm.de/lynn_hershman/Program-O-master/gui/plain/index_en.php

[3]http://aoys.zkm.de/lynn_hershman/Program-O-master/gui/plain/index8.php

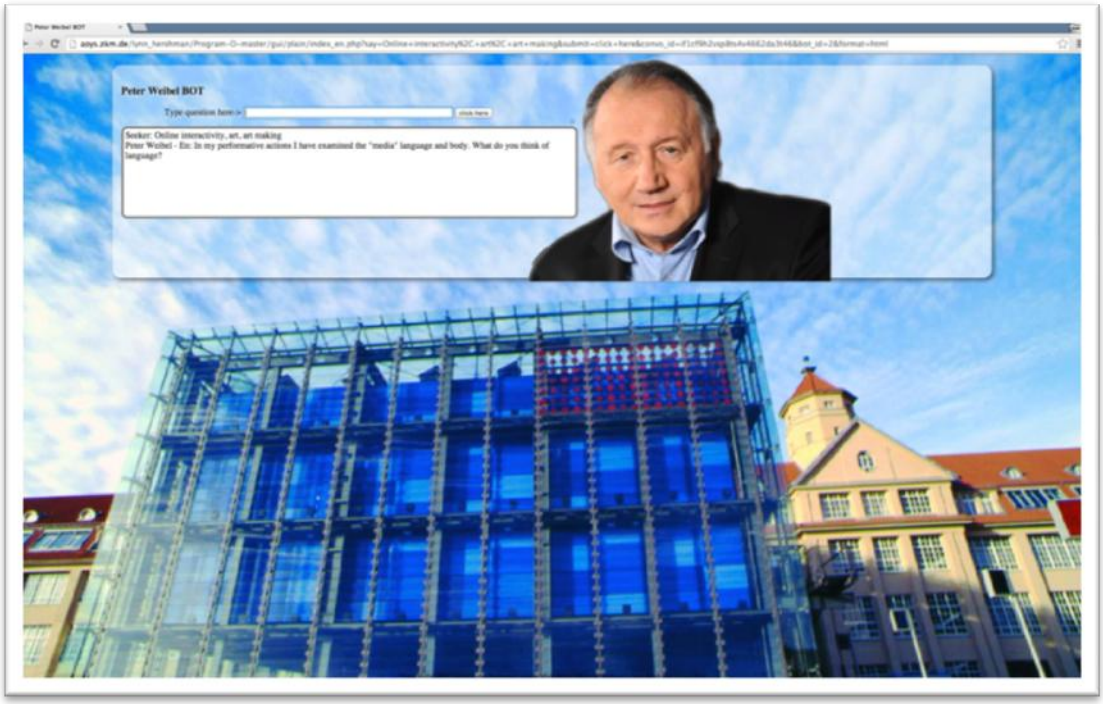

Figure 5. Lynn Hershman Leeson. *Weibel-/Manning-Bot*. 2013-2014

Note: Screenshot detail. Web project <http://aoys.zkm.de/lynn_hershman/Program-O-master/gui/plain/index_en.php>. commissioned by ZKM, Germany. © Lynn Hershman Leeson

Figure 6. Lynn Hershman Leeson. *Weibel-/Manning-Bot*. 2013-2014

Note: Screenshot detail. Web project <http://aoys.zkm.de/lynn_hershman/Program-O-master/gui/plain/index8.php>. commissioned by ZKM, Germany. © Lynn Hershman Leeson

Rafael Lozano-Hemmer

Working with various types of interactivity in his installations and Internet works, Rafael Lozano-Hemmer is an important example of how artists began working with interactivity and digital technology. Lozano-Hemmer works with advanced technologies and often creates large-scale interactive installations in public space. Lozano-Hemmer defines his large-scale interactive installations as "relational architecture." Interactivity in his installations often is triggered by either viewers' physical participation or web-based interaction.

Selected early and recent works: *Vectorial Elevation* (1999-2000) and *Friendfracker* (2013). *Vectorial Elevation* was an interactive installation utilizing searchlights in Zócalo Square, Mexico City (see Figure 7). Since the first installation in Mexico City in 1999, *Vectorial Elevation* has evolved into different editions and travelled all around the world, including sites in Vancouver (2010), Dublin (2004), Lyon (2003) and Vitoria-Gasteiz (2002). Some versions contain additional components such as communication technologies and physical participation to create light movements. The Philadelphia version of *Open Air* (2012) required the viewer to send text messages through a mobile app. *Articulated Intersect* (2011), in Montreal, called upon the viewer's physical interactivity, allowing them to change light movements by moving lever-controllers on the ground.

Vectorial Elevation required global public online interactions. Viewers could visit the website and design light presentations which followed pre-programmed light movements (see Figures 8 & 9). Lozano-Hemmer's first edition of *Vectorial Elevation* in Mexico City provides insight into how digital and web technology influence and form interactivity in a physical site and virtual online space. During the exhibition period, 800,000 visitors from eighty-nine countries participated in this interactive public space installation through *Vectorial Elevation*'s websites, an online virtual public space.

Figure 7. Rafael Lozano-Hemmer. *Vectorial Elevation*, Relational Architecture 4, 1999

Note: *Vectorial Elevation* was installed in Zócalo Square, Mexico City, México. Installation view. Photo by: Martin Vargas

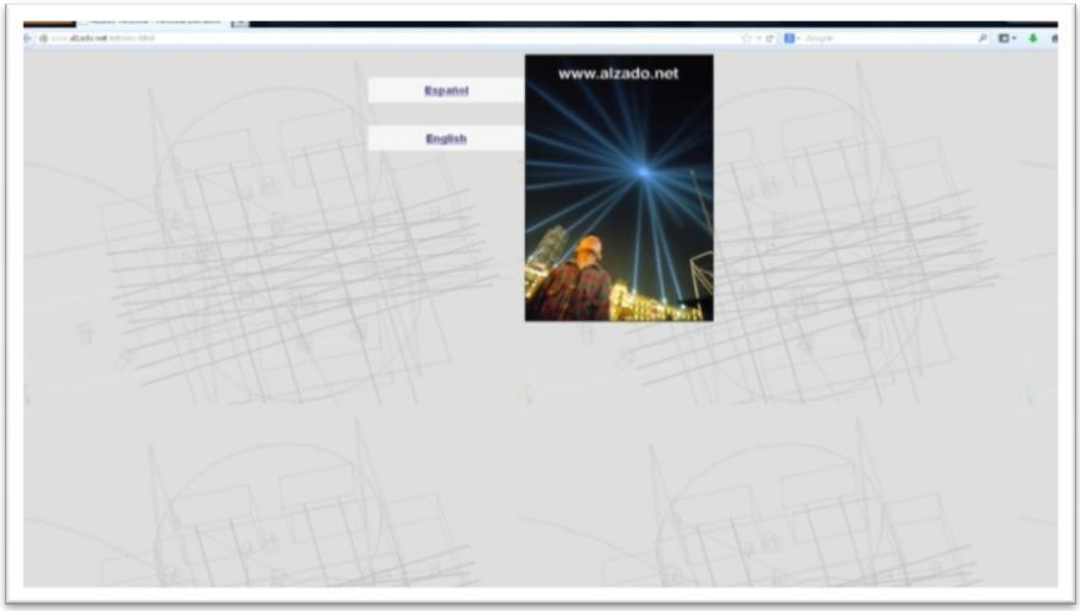

Figure 8. Rafael Lozano-Hemmer. *Vectorial Elevation*, Relational Architecture 4, 1999

Note: Screenshot detail of the entry page. Web project (http://www.alzado.net/intromx.html) and light installation in Zócalo Square, Mexico City, México. © Rafael Lozano-Hemmer

Figure 9. Rafael Lozano-Hemmer. *Vectorial Elevation*, Relational Architecture 4, 1999

Note: Screenshot detail of the home page. Web project (http://www.alzado.net/intromx.html) and light installation in Zócalo Square, Mexico City, México. © Rafael Lozano-Hemmer

Friendfracker was created on April 20, 2013 by Rafael Lozano-Hemmer and computer programmer Harper Reed in a single day during the 7 on 7 conferences organized by Rhizome, the New York-based new media art organization (R. Lozano-Hemmer, personal communication, November, 2015). *Friendfracker* was an online application based on the social network Facebook's API program, which is an application programming interface key (see Figure 10). The user visited *Friendfracker*'s website and authorized *Friendfracker*'s application to access their Facebook's account. This online browser program then randomly deleted one to ten Facebook friends. This action of deleting the user's Facebook friends operated once. The *Friendfracker*'s application would not notify the user's Facebook friends who were deleted. If the user recognized their deleted Facebook friends, they could always be reinstated. *Friendfracker* transformed the online social network into an artistic medium. Due to violation of

Facebook's policies and terms, the corporation Facebook disabled *Friendfracker* on April 25, 2013.

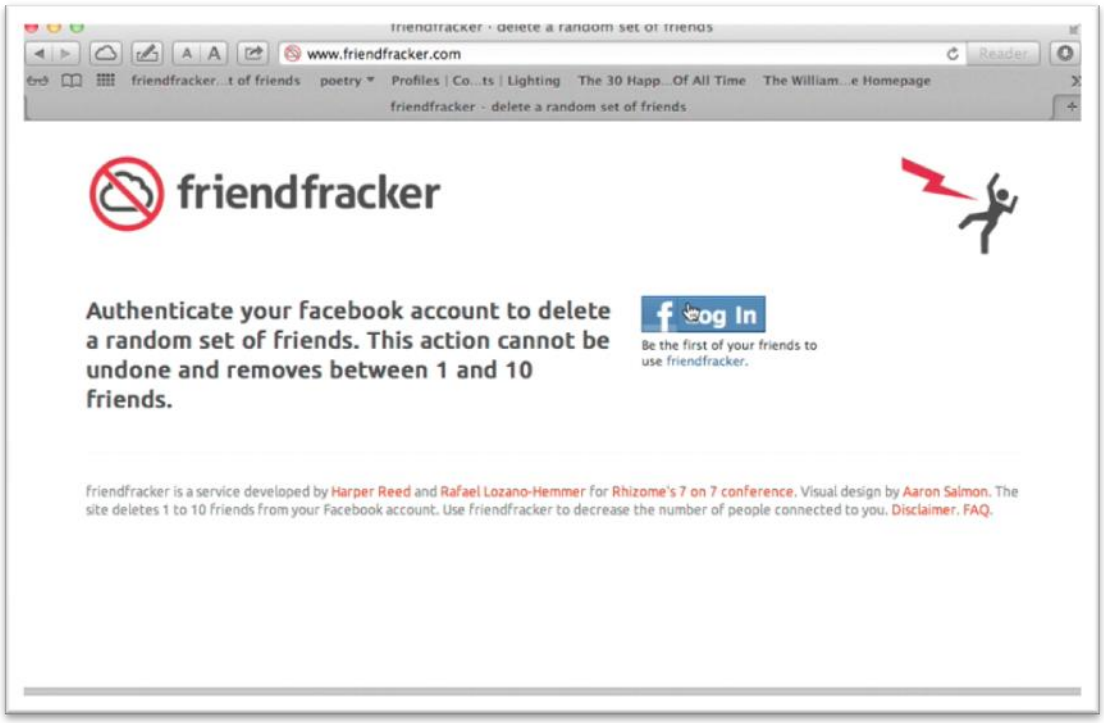

Figure 10. Rafael Lozano-Hemmer and Harper Reed. *Friendfracker*. 2013

Note: Web project, Facebook API. © Rafael Lozano-Hemmer

Martine Neddam

Martine Neddam is one of the early Internet art pioneers. Neddam's early practice focused on traditional media such as sculpture and installation, often in public space. While she was working on a few public art commissions in the mid-1990s, Neddam began working with web browsers and the Internet and found her true interest in creating web-based art (M. Neddam, personal communication, August, 2015). In 1996, Neddam anonymously created her first interactive online work *Mouchette*[4] (see Figure 11). An active member of the art world since then, Neddam has shifted her artistic interest from

[4]http:// mouchette.org

traditional media to Internet technologies- in particular, online web-based browsers. She often creates virtual characters in web-based works, including *David Still* (2001) and *XiaoQian* (2006). These web-based works usually allow the visitor to use her virtual characters' Internet identities. *David Still*'s website, for example, includes an introduction of the virtual character David Still's life. The only way of communicating with the visual character, David Still, is to send him a message on "his" website for any inquires, including using his online identity. By using Internet technologies, Neddam has continued examining issues of identity in a global Internet culture.

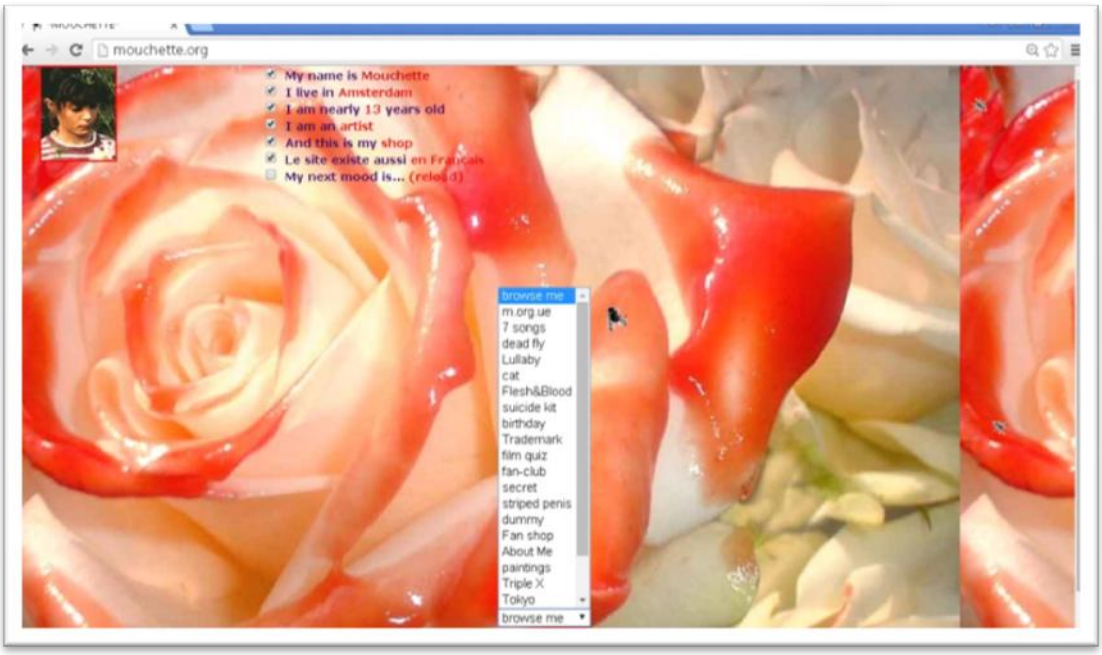

Figure 11. Martine Neddam. *Mouchette*. 1996

Note: Screenshot detail of the home page. Web project (http://www.mouchette.org). © Martine Neddam

Selected early and recent works: *Mouchette* (1996) and *MyDesktopLife* (2013). Neddam created the virtual character Mouchette, who is a thirteen-year-old girl and an artist living in Amsterdam. *Mouchette* reflects on socio-cultural issues of online identity, gender and death. *Mouchette*'s is still live on the Internet.

The opening page of *Mouchette* is composed of photographic, textual, and sound (someone is crying) elements which subtly provide the visitor instructional hints. The first visual impression of *Mouchette* is desktop-wallpaper-like images of a flower as the background. Three animated flies are on the right side of the webpage. A portrait of a teenage girl is on the top left corner. Seven lines of purple and red texts next to the portrait briefly introduce this virtual character Mouchette (see Figure 12). The red key words show primary information about the virtual character Mouchette. However, the artist seemingly invites the visitor to fill in their own words into these statements. Each line has a check box in front of the text. On the center bottom of the webpage, a pull-down menu provides a list of key words which take the visitor to different web links. Dynamic interactivity was created in *Mouchette*. *Mouchette*'s visitor can also become the virtual character, Mouchette, by signing up to a Mouchette ID membership. In doing so, *Mouchette*'s interactivity involves an online community.

Figure 12. Martine Neddam. *Mouchette*. 1996

Note: Screenshot detail of the home page. Web project (http://www.mouchette.org). © Martine Neddam

Since 1996, *Mouchette* has gone through different stages of the Internet development and evolved into different art projects. For example, Mouchette.net creates an online space for sharing thoughts and ideas for Mouchette's Internet community (see Figure 13). The user, based on the main structure of *Mouchette*'s website, builds their individual version of Mouchette's online presentation.

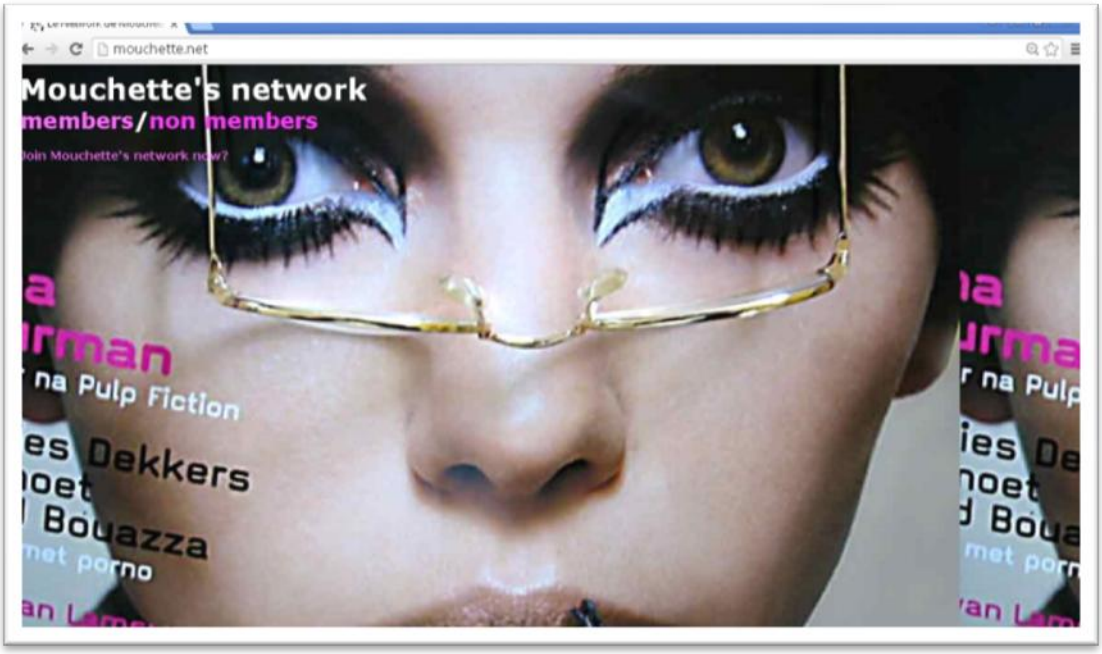

Figure 13. Martine Neddam. Mouchette.net

Note: Screenshot detail of the home page. Web project (http://www.mouchette.net). © Martine Neddam

Mouchette, in summer 2011, came to the real world in physical form as part of the installation, *The Guerilla Fanshop Mouchette* (see Figure 14). This shop installation was created in public space, in Amsterdam, after the original work was created fifteen years earlier. *Mouchette*'s online admirers could purchase souvenir products related to *Mouchette*, such as bags, key chains, postcards, pins, notebooks, and bracelets. *The Guerilla Fanshop Mouchette* installation also accompanies an online presentation of the fan shop on shop.mouchette.org. The website of *The Guerilla Fanshop Mouchette* is still active.

Figure 14. Martine Neddam. The Guerilla Fanshop Mouchette. 2011

Note: Screenshot detail of the home page. Web project (http://shop.mouchette.org). © Martine Neddam

In addition, Neddam created the blog about.mouchette.org to archive and preserve *Mouchette* related discussions and links. The domain about.mouchette.org helps the visitor to learn *Mouchette*'s history and context.

Her latest work is the interactive browser software *MyDesktopLife* developed in 2013 with programmers. In the early stage of creating *MyDesktopLife*, Neddam received funding from ZKM.

Unlike her online web-based work of virtual characters, Neddam's latest work *MyDesktopLife* is about online creativity in a browser. Neddam intends to break limitations of current editing and design software, which is updated rapidly in today's Internet world. This software provides the user the opportunity to create and edit moving images online in a browser. Neddam works with programmers to invent new online software of editing multimedia. *MyDesktopLife* has its own unique work interface.

Neddam currently invites only beta users, in workshops to experience and interact with *MyDesktopLife*.

Chapter V

DATA ANALYSIS

The primary goal of this study is to explore the connections between the artistic experience of working with online interactivity and its reflection in studio teaching. As such, this study's first step was to understand how the participating digital media artists create and conceive of online interactivity. Consequently, this study further explores the possible relationships between these and their pedagogies of studio art teaching, based on patterns found in their artistic practice. Toward this end, this chapter is composed of seven sections. Each section presents a theme in response to one of the individual research questions articulated in Chapter I.

Each section presents a unit of discovered key concepts which represents themes repeated with regularity in the participating artists' responses to research questions. Each section concludes with a discussion of within-case analysis. Each key concept was derived directly from In Vivo codes based on recurring patterns of phrases in the process of open coding and categorizing interview data. I created an Excel file to count how many times related words occurred in the interview data in order to look for recurring concepts. The frequency of phrases in the interview data allowed me to explore indications and connections amongst the overarching research questions. Then, I determined which word, set of words, or phrases constituted a key concept in the coding process. These key concepts reflect ideas and abstractions of the interview data. Additionally, in some sections, each primary key concept is further divided into clusters

of related sub-concepts. Each key concept begins with a short description of ideas and abstractions and is followed by examples of excerpts from interview data as evidence for unfolding information and ideas (Merriam, 2009).

Sections One through Five explore related themes of online interactivity in the participating digital media artists' artistic processes. In these sections, the artists recounted his or her artistic process of conceiving and creating online interactivity across different periods of time. Section One focuses on responses to the primary research question in this study: the role of online interactivity in the artistic process. Sections Two to Five are dedicated to exploring each individual sub-research question, including artistic strategies, forms of online interactivity, required digital technologies, and artistic historical contexts.

Sections Six and Seven address the artists' descriptions of their studio teaching experiences in relation to the artistic practices of online interactivity. Section Six explores the artists' studio pedagogies. Section Seven emphasizes the artists' instructional strategies for teaching.

Section One: The Role of Interactivity in the Artistic Process of Web-Based Art

This section presents a gestalt of the role of online interactivity in the artistic process. The artists described their concerns in the artistic process of online interactivity. According to the interview data, the role of online interactivity is more related to the artists' aesthetic of creating and using online interactivity. The four key concepts that emerged in response to the role of online interactivity in the artistic process are *active participation, relationship, freedom,* and *artistic language* (see Table 1).

Table 1. Key Concepts in Response to the Role of Online Interactivity in the Artistic Process

The Role of Online Interactivity in the Artistic Process	
Key Concept	Examples
ACTIVE PARTICIPATION	"This happened in *Lorna*. No one could understand what I was doing so I had to write a text and it relied on both a viewer and user. I used that term [the user] because it was an *active* verb that engaged the *participant*" (L. Hershman Leeson, personal communication, August, 2015).
RELATIONSHIP	"For me, interactivity not just online but in general for art, interactivity is the capability to establish a *relationship* of trust or a relationship of complicity. A relationship with the public, as an integral part of the artwork" (R. Lozano-Hemmer, personal communication, November 11, 2015).
FREEDOM	"I think that the *freedom* that Marta Minujin had in her projects is exactly that. It's something that we should recover, that possibility for the artwork to be surprising" (R. Lozano-Hemmer, personal communication, November 11, 2015).
LANGUAGE	"In fact, if it were not for the online connectivity, I most likely would not be an *artist* because my strength is in connecting things. For connectivity, the online world is where I have been able to find my place. I think that [the online world] is the *language* that I speak" (R. Lozano-Hemmer, personal communication, November 11, 2015).

Active Participation

The term "active participation," as described by the artists, is defined as the process of viewing, which is itself a series of reciprocal actions between the web-based art and the viewer. That is, the viewer of traditional static artwork becomes a "user" and "participant" in a work of web-based art. During the process of interactivity, the user integrates viewing and creating individual content into their action in response to the artists' web-based work.

Online interactions results in producing the user's context. "Active participation" is composed of two significant components: *action* and *context*. Examples:

> [The role of online interactivity] is crucial because it is about a different kind of liveness, one that feeds off users. In fact users are the energy and life blood of the connections, and the works seem static if they are not building a

> cumulative vision. (L. Hershman Leeson, personal communication, August, 2015)
>
> This idea of the active role of the participant is what interactivity brings. (R. Lozano-Hemmer, personal communication, November 11, 2015)
>
> I would say it's like shared imagination. [My] imagination and the imagination of others are being shared in the most direct way. For example, when I make a little narrative and I leave a place in question, suddenly people enter that work with their imagination and they continue the work or they add to the work with their own imagination. (M. Neddam, personal communication, August 21, 2015)

According to the artists, the artists are aware of the fact that the viewer takes an active role in the artistic process of online interactivity. In this way, their works allow the viewer to engage in dynamic online interactions depending on the nature of their various web-based projects. The artists believe that lively participation is essential and crucial in creating interactive web-based work. The artists further the idea of active participation by recounting their individual experiences of creating web-based art in the past two decades (1997-2016).

When reading Hershman Leeson's response to the role of online interactivity in her artistic process, my attention was drawn towards the words "liveness" and "user." Hershman Leeson redefines the viewer of traditional art as "the user." The concept of user in the creative process of online interactivity is later explained in the key concept of freedom.

Lozano-Hemmer exemplifies online interactivity in a broad picture of interactivity. Interactivity, for Lozano-Hemmer, creates complex relationships between the artist, the work, and active participants. This dynamic relationship with the public is fundamental to the completion of the work of interactive art. Lozano-Hemmer suggested the public's interactions result in a finalized artistic form of online interactivity. In addition, he connected Marcel Duchamp's idea of non-retinal art to the idea of interactivity in the artistic process.

The idea of "shared imaginations" in Neddam's quote on the previous page refers to the user's creation based on the artist's web-based work. That is, online interactivity allows the viewer to use elements in Neddam's artwork and create the user's own versions of Neddam's work. In a two-hour interview, Neddam frequently repeated the words "share" and "imagination." She explained the importance of sharing imagination in her practice. For her, the artistic goal is to create a platform on the Internet where the public can share and develop its imagination. Neddam's account of online interactivity aligns with the action of online sharing.

The two related key concepts *action* and *context* further explain the idea of active participation.

Action. As the artists described, the idea of the viewing process in their web-based work constructs a series of the user's actions. They provide the user the ability to do something in response to their work. The artists illustrated various forms of interactions in their web-based work. These interactions relate to the artists' reflections on culture, society, economics, politics, and history in the real world. Beyond a traditional way of looking at interaction in Internet art, human activities involved in the artists' creation are more than clicking and viewing on a screen. Examples:

> *Friendfracker* just asked you to sign in, and give permission to our software, to delete at random, one to ten friends. Then, [the program] just notified you, how many friends had been zapped, how many had been deleted. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> I studied linguistics. I was using language as a work of art. I was very aware of the performativity of language. Let's say when you ask a question, this performativity of a question or language … [A question is] read by a lot of people, also not people who are in linguistics. [A question] changes so much the way we think about language, that language is something that performs. [Language] doesn't describe the world so much as it performs an action. I was very aware in my work of art that when I was writing a word, I was performing an action. In the sense, I was triggering a reaction also. I was using this performativity of language asking a question. Let's say, even if you never hear the answer, you've already acted on the viewer. (M. Neddam, personal communication, August 21, 2015)

The artists' work requires the user to do something during the process of *viewing.* For example, Hershman Leeson frequently stressed that the user's actions are essential to the role of online interactivity in her artistic process. Lozano-Hemmer recounted his experience creating *Friendfracker*, which involved reciprocal actions between the artist and the user. As he described it, the artist had to receive permission from the user in order to trigger the next interaction in *Friendfracker*. Next, the user has to sign in their online social network account to run the application designed by the artist. Later, the program would run the action of deleting friends in the user's account.

Neddam received training in linguistics and therefore connected the idea of interactivity to "the performativity of language." She explained the use of language in her practice of online interactivity that the performativity of language initials the user's reaction.

Context. The artists regularly expressed that creating online interactivity, for them, is to create a space where the user performs various interactions and builds content for the work. The concept of context stands for production of context by the user during the process of viewing. The artists believe that online interactivity enables the user to organically create the context for the work. And, later this unique context created by the user later finalizes the work. Examples:

> [The] more people connect, the richer the piece. (L. Hershman Leeson, personal communication, August, 2015)

> It is *the context* that creates the artwork. It is that view, that look of the public that creates the artwork. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> Interactivity, what it is, what it's saying is that the artwork does not exist by itself, that the artwork is incomplete. It is through interactivity that, the relationships, that this aura that we were talking about, emerges. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> On the Web, you have something more, [which] is that you can pass for the character. You can say, "It's me," or you can say, "I have made this site." For me, that was also the most important discovery. That I was not just

> making this, but people would pretend it's their own creation. That was a big pleasure to see that, and to make it possible as well. (M. Neddam, personal communication, August 21, 2015)

Hershman Leeson believes that it is the user who makes the work have meaning. In other words, the concept of context in Hershman Leeson's thinking is defined by the user's interactions in web-based art. Lozano-Hemmer, in addition, considers the user's interactions as an approach to building the context and then completing the work.

To elaborate on the idea of context in her work, Neddam talked web-based works that incorporate virtual characters. Users are subtly encouraged to interact with virtual characters in order to their own unique version of the project in a new context. For example, the user can appropriate these virtual characters' identities by using the characters' names and email addresses. In addition, the user who is familiar with web design and programming can create a new online presentation by adopting elements and contents from Neddam's web-based works.

Relationship

The artists described in the interview that one of the essentials to online interactivity is to build a complex relationship between the work and the users. Later, this singular interactive relationship between the work and the user was found to be located within a larger collective of multiple interactive relationships.

The quote in Table 1 shows that Lozano-Hemmer suggested interactivity in the artistic process is to create and form multi-dimensional relationships between the artist, the work, and the people. This relationship does not happen in a singular but interactive communication. The concept of relationship is elaborated by the related concepts *connectivity* and *horizontal dialogue*.

Connectivity. We already understand that the Internet connects people globally but we do not know why the artists choose to use the Internet and online interactivity in their

work. Their responses help us understand their rationale for using Internet to connect user in a web-based art work. Examples:

> Use the net to connect people. (L. Hershman Leeson, personal communication, August, 2015)

> Metaphorically and poetically and critically, the project works because it's trying to find the students within yourself, within the public themselves. In so doing, you're establishing a relationship of complicity, of a fraternal link. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> I live in my head with people who live in their head as well, because this very simple sharing of imagining work in the situation where you connected to your dreams and imaginations. (M. Neddam, personal communication, August 21, 2015)

The three examples in the interview data show that the artists have different approaches of connecting people in their web-based work. However, connecting people is essential to their practice of online interactivity. For example, Hershman Leeson responded concisely that using online interactivity in her practice is to bridge users. Lozano-Hemmer recalled his experience of creating *Level of Confidence* to explain that interactivity lends linkages to users a complex relationship. Neddam considered that connectivity refers to open-ended interactions of sharing imagination with people.

Horizontal dialogue. The artists suggest that online interactivity lively establishes a dynamic relationship between the artist, the work and users. This interactive relationship is built by connectivity. The artists would envision that this contextual relationship, furthermore, signifies rhizomatic dialogue among the artist, the work, users in their web-based art. Examples:

> *Weibel-/Manning* were extensions of my exhibition of ZKM, adding current bots that were trilingual to extend the dialogue. (L. Hershman Leeson, personal communication, August, 2015)

> Whereas, when the software is distributed freely, you get a sense of dissemination. It's more horizontal, it's more like a dialogue. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> That a work of art is like a good conversation between the viewer and the work of art. It's an ongoing conversation. (M. Neddam, personal communication, August 21, 2015)

Hershman Leeson recalled her process of creating a new chat bot piece *Weibel-/Manning* at Zentrum für Kunst und Medientechnologie Karlsruhe (ZKM) in in Karlsruhe, Germany, a distinguished German media art center in the world. In order to reach a wider audience in her work, she expanded the chat bot's language abilities in *Weibel-/Manning*. Unlike her first chat bot work *Agent Ruby*, which only speaks English, the chat bot Weibel speaks three different languages, including German, French, and English. Lozano-Hemmer's idea of horizontal dialogue originates from the characteristic of "dissemination" found in online activities. Neddam said that her practice of online interactivity brings the idea of dialogue. Accordingly, Neddam considers horizontal conversation as an "ongoing conversation with one viewer and many viewers, and many viewers." The idea of open conversation is fundamental to her practice of online interactivity.

Global dialogue. This concept of horizontal dialogue is further developed into a global scale. The artist use online interactivity to connect global online users. In hindsight, it is easy to recognize the global nature of the Internet. The artists, then, use this nature of global connection to create web-based art to promote "horizontal dialogue" on world issues. Examples:

> Basically I wanted to create a global dialogue in both of [*Agent Ruby* and *Weibel-/Manning-Bot*]. (L. Hershman Leeson, personal communication, August, 2015)

> I have made artworks that can only exist inside of an online, connect the world. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> You would do something and then you would place it online and somebody would see it somebody might react to it. (M. Neddam, personal communication, August 21, 2015)

Hershman Leeson clearly stated that her intention of using online interactivity is to create global communication. Lozano-Hemmer also expressed in a similar way that his

artistic objective is to "connect the world" through his online work. Neddam addressed her interest in online reciprocal communication between the artist and users.

Freedom

The idea of freedom in the artists' practices of web-based art was regularly revealed in the interview data. The importance of freedom brings independence of the user and the web-based work itself. As a result, the artists elaborated the concept of freedom from the perspective of the user and the work. The two components *user* and *open work* describe the concept of freedom. Examples:

> The work exists independently, that it breeds online, that it does not need a human to oversee its function. (L. Hershman Leeson, personal communication, August, 2015)

> This idea of [an Internet] medium that there is no center, no hierarchy. (M. Neddam, personal communication, August 21, 2015)

The concept of freedom reflects in Hershman Leeson's response to the work existing independently on the Internet. Online interactivity grants the work autonomous power from the user's interactions. In Hershman's words, the user's interactions are described as "breeding online." She said, "That [the work] breeds online, that [the work] does not need a human to oversee its function."

Lozano-Hemmer exemplified the concept of freedom in a work of art with the Mexican pioneer artist Marta Minujin's practice (see Table 1). He stated that the artist should bring freedom back in the process of "creating" and "seeing" a work of art.

Neddam argues that the nature of the Internet provides a certain degree of autonomy. According to her, there is "no hierarchy" on the Internet. As she described regularly that people are "the sender" and "the receiver" at the same time.

User. Interactivity, as the artists described, is the user's dynamic engagements in their web-based art. The concept of active participation described earlier connects the

nature of freedom and the user in the artists' web based art. The artist frequently claims that the user is entitled to the control of interacting with the work. Examples:

> The idea of using these technologies [is] to create something in a way that they were not meant to. These searchlights are always controlled by a system of a top-down system of surveillance, or choreographing. In our case, it was not like that at all. They were completely free to move in whatever way that the users wanted it. It was more of an inversion of that power dynamic. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> That's why sometimes interactivity as such as a concept, let's say, is not so much appealing to me because it doesn't give freedom to the viewer. It does only give a choice between certain prepared options. When it opens to the freedom of the user, then I like it. You don't necessarily have to click to do that. (M. Neddam, personal communication, August 21, 2015)

The viewer commonly referred to a person looking at a work of traditional art. In the interviews, the three artists regularly used the term "the user" to describe the viewer in their process of creating interactive web-based work.

In the email interview, Hershman Leeson told the reason of using the term the user to describe her practice of online interactivity. She recalled that in that time her digital interactive installation *Lorna* (1983) which combined the role of the viewer and user. Her advanced thinking of creating interactive digital art did not make sense to people. As a result, she wrote a text to explain the concept.

The independence of the work, as Hershman Leeson's belief, describes the concept of the user's power in web-based art. She said, "The work exists independently, that it the work breeds online." This response reflects that the user's power comes from interactions between the work and the user. Similarly, Lozano-Hemmer talked about viewpoints of technology and politics to describe the user's freedom. In addition, Neddam explained the use of the concept of freedom in her practice of online interactivity. Interactions in her web-based art are created more than clicking options on a screen.

Open work. The interview data show that the concept of freedom creates open-ended interactions in the artists' web-based work. Examples:

> Interactive works are open. (L. Hershman Leeson, personal communication, August, 2015)

> I love that the artwork can have a life beyond what I originally intended. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> What I found so exciting by being an artist on the Internet is that I could create my public. I didn't depend on someone else to bring the public to me. In that sense, I don't know if you call it interactivity art, but that was a very important part. I could find and create my public and access my public. I didn't need an institution in between that would mediate between the public and my work of art. I could have something direct. (M. Neddam, personal communication, August 21, 2015)

Hershman Leeson discussed the differences and similarities between creating a traditional tangible work and an interactive web-based work. She said that online interactive art is contingent. Lozano-Hemmer's intention of creating interactive web-based art was to expand dialogue with users. Neddam appreciated that Internet technologies allow her to create art which directly and independently connects with her audience.

Language

The concept *language* suggests the artists' artistic approach (Dewey, 1934) of creating interactive web-based art. The artists frequently expressed that they use online intercity to make art as a concept and a medium in the artistic process. The related concept *different fetish* further illustrates the concept *language*. Examples:

> It's like a language. It's something we cannot be outside of accepting this inevitable aspect of online technology. My work, everything from conception, research, design, all the way to programming itself, to implementation, to fabrication, takes place online. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> The click in itself is not so important or filling in text is in itself not so important but opening the imagination is what [is important] and creating a new medium with new specification. This is what I'm still busy with: trying to create new software to mix sound text and images in a certain way and share that software. (M. Neddam, personal communication, August 21, 2015)

Lozano-Hemmer said straightforwardly in the interview that online interactivity is one of very important artistic elements in his practice. He paralleled his artistic approach of using online interactivity with the use of language. For Lozano-Hemmer, using online technology becomes a common sense in today's world. None of us would be excluded, including himself.

Neddam talked about the relationship between of the use of Internet technologies and her creation of online interactivity. According to Neddam, "opening the imagination" is important to online interactivity, instead of the physical actions of clicking and typing. As a result, she sought to create a new program in order to create that kind of online interactivity in her work.

Different fetish. The artists repeatedly expressed that Internet technologies make their art conceivable in various dynamitic forms of interactivity. In other words, Internet technologies aid the artists in creating interactivity coming into existence and evolving the work from traditional art as a static object. The related concepts *experience* and *instructions* further explain the concept *different fetish*. Examples:

> [*Agent Ruby* and *Weibel-/Manning-Bot*] are pretty similar except Weibel speaks three languages. (L. Hershman Leeson, personal communication, August, 2015)

> This idea of, the fetish of the artwork is completely different now, with mechanical reproduction. Now with digital reproduction, because what you want is the opposite. You want it not to be special. You want it to be a treatment, you want it to be everywhere you look. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> That's the interactivity. You will find the situation, create the situation where art happens even when you don't make an object. (M. Neddam, personal communication, August 21, 2015)

Herdsman Leeson's quote above indicates that her online chat bot works, talks, and speaks to users. This feature of language abilities in her chat bot characters distinguishes her interactive online art from traditional art.

Lozano-Hemmer used the word "fetish" to suggest that traditional and interactive digital art produce different results of creating and experiencing the work. Lozano-Hemmer stated that digital technologies provide diverse means of making art.

Creating online interactive art, as Neddam described, is to build "the situation" among the artist, the work, the user. Her response shows that online interactions do not rely on materialized objects.

Experience. The artists acknowledge the impact of digital technology on their creation. Consequently, they value the user's experience in their interactive web-based art. Examples:

> [The] moment of experiencing the artwork is, a singularity, it's an exception, is irrepeatable. Paradoxically, to achieve this, we actually can and do copy digitally, the projects, where there is no originality. It's like a change in emphasis, from the object to the experience. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> I was so amazed and I'm still amazed because the answers continue how people invested in their imagination with that story. (M. Neddam, personal communication, August 21, 2015)

By using digital approaches, Lozano-Hemmer saw that the art-making process tends to create "the experience."

Neddam's quote above described how the concept of experience actually happens in her work. She talked about one of many interactions in her first web-based art *Mouchette*. For example, *Lullaby for Dead Fly*'s has a fly on a webpage. As the user clicks the fly, this interaction leads to the next interaction. The following screen shows a paragraph of texts and a tell-me box. At the same time, the sound of a female person crying is in the background. The text displayed on the webpage is:

> Only a minute ago
> I was happily flying over your plate
> and
> now
> I'm
> dead

> BUT HOW CAN I WRITE THIS SINCE I'M DEAD???
> TELL ME!!!
> (*Mouchette* website[1])

When *Mouchette*'s user clicks "TELL ME!!!," a new window pops up and shows the heading "Contact Us." The user is encouraged to write to Mouchette about the death of the fly. As *Mouchette* is still alive on the Internet, the artist and users' stories have continued since then.

Instructions. The artists shared their artistic experience of creating online interactivity that sometimes their web-based work requires explanations and guidelines for the user to understand and operate the work. Examples:

> There was a lot of explaining to do, and there was a lot of training that, in a way, we had to give the different users, to understand what the piece was doing. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> Today, as we have digital artworks, we understand that we also are instruction-based. We have a set of instructions that creates the artwork. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> For example, with *MyDesktopLife*, I find that I have to collaborate with people to help with designing the interface to make it understandable for the user. This is also complex to understand: what the user sees and does not see or how you explain things to [the user]. (M. Neddam, personal communication, August 21, 2015)

Hershman Leeson's interview excerpt shows her advanced thinking of working with digital interactivity in the early Internet age. Her previous writing explains how digital technologies and interactivity are used to create art.

Lozano-Hemmer's first quote describes his experience of creating *Vectorial Elevation* in 1999. Back then, Internet access was at the stage of germination. People were not familiar with Internet technologies. In the process, Lozano-Hemmer had to explain to the public about the piece. The second quote shows Lozano-Hemmer's observation of the relationship between digital technologies and art-making.

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[1]http://www.mouchette.org/fly/dead.html

Neddam's recent project *MyDesktopLife* is new software developed by her and programmers. During the process of creating *MyDesktopLife*, Neddam hosted some workshops in order to collect the user's experience and make this piece understand to the public.

Section Two: Artistic Strategies for Creating Online Interactivity

This section discusses the artists' conceptual strategies for conceiving and creating online interactivity. By using online interactivity, the artists seek for people to encounter their work globally. Moreover, these online interactions reflect on world issues. The artists' intentions are described by the following key concepts: *collage of users*, *uncertainty*, and *global reflection* (see Table 2).

Collage of Users

The term *collage of users* is derived from the interview with Hershman Leeson (see Table 2). She believes that interactive web-based work centers around Internet users. Hershman Leeson stated that the more users engage, the more sophisticated the work becomes. The concept *collage of users* is composed of two related concepts: *shared field* and *viral presence*. Examples:

> In the case of most of my interactive artworks, what you're looking for is, you're looking for a public, as actor. You're looking for the public to have agency, to have a say. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> That would be my ideal image of what an interactive work could produce is a sort of collective imaginary world. (M. Neddam, personal communication, August 21, 2015)

Table 2. Key Concepts in Response to Artistic Strategies in the Artists' Artistic Processes of Web-Based Art

Artistic Strategies in the Artists' Artistic Processes of Web-Based Art	
Key Concept	Examples
COLLAGE OF USERS	"Interactive works…continue to be open using the *collage of users* to fill it in a way that can be strategized and conceptualized in a flow chart, but not actualized until it happens" (L. Hershman Leeson, personal communication, August, 2015).
UNCERTAINTY	"What we wanted is to destabilize, to make you feel conscious of, you go back to Facebook, you don't know who got deleted. In that, is the artwork. The artwork is in that *uncertainty*" (R. Lozano-Hemmer, personal communication, November 11, 2015)." (R. Lozano-Hemmer, personal communication, November 11, 2015).
GLOBAL REFLECTION	"*Agent Ruby* originally was meant as expanded cinema, but it is really a reading of the *global* web presence and *reflection* of important issues over time. Same with *Weibel-/Manning*" (L. Hershman Leeson, personal communication, August, 2015).

The artists expressed that their interactive web-based art is a platform to create users' collective experience. For example, Hershman Leeson explained that the work of online interactivity employs connections among online users to make the work open and dynamic.

The use of online interactivity in Lozano-Hemmer's practice creates an organic experience to build interactive relationships among the artist, the work, and the user. A single user or multiple users in Lozano-Hemmer's artistic process are agents of online interactivity. He said, "In the case of most of my interactive artworks…you're looking for a public, as actor. You're looking for the public to have agency…"

In her interview, Neddam regularly emphasized sharing imagination in her practice. Her quote above reveals that she intends to form a "collective imaginary world" through her online interactive projects.

Shared field. The artists expressed that the purpose of using online interactivity is to build a platform where users create dialogue and connections. Examples:

> In the case of *Vectorial*, we are trying to create a platform for people to express themselves. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> Creating a common field of imagination, I would say. This is how I would define to my ideal what Internet and interactive work could create is a sort of shared field of imagination. (M. Neddam, personal communication, August 21, 2015)

> It's like imagination our big space where I create a platform with my own material for their imagination. For a while, their imaginations are staged within my story. (M. Neddam, personal communication, August 21, 2015)

Lozano-Hemmer's artistic objective in *Vectorial Elevation* was to invite the public to express freely, as he stated in the interview. Therefore, he created an online space accompanying a physical installation of searchlights in public. In *Vectorial Elevation,* people were allowed to respond to the work and design presentations of lights on web interfaces.

Similarly, Neddam explained that her artistic intention of using online interactivity is to "create a platform" of what she called a "shared field of imagination."

Viral presence. One of the vital features of the Internet is to overcome the limits of time and space by encouraging a global connection. The artists recognize and utilize this essential feature of the Internet to reach a wider global audience. Examples:

> If you make an artwork online, and then you're lucky and it's good, and then it becomes viral. All of a sudden, your public is no longer 2 or 3000 people, which normally follow performance art. This is, all of a sudden, the project has the potential to go into hundreds of thousands or millions of different viewers. This capability that the pieces have to scale-up to viral presence is something that certainly is new. It was not possible before. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> [Sharing] an imaginary world with the imaginary world of other people. (M. Neddam, personal communication, August 21, 2015)

Hershman Leeson said that her purpose of using online interactivity is to connect users in her work. What is even more important is to connect as many users as possible. Lozano-Hemmer recognized the impact of Internet technologies on "viral presence," and then used this feature of information dissemination via the Internet to reach the maximum

number of users in his art. In the same way, Neddam stated that she expects to share creative thoughts with other people through her art.

Uncertainty

The interview data reveals that although the artists preprogrammed online interactivity and set up a predesigned platform, the result of their web-based artwork is unpredictable. The artists believe that the form of their interactive web-based art is in a constantly changing state. Each interaction shapes the form of their work in various presentations. Examples:

> It is like improv, you build something through intuition. (L. Hershman Leeson, personal communication, August, 2015)

> I did not anticipate the massive storage of information about people's interests and priorities globally, or how the piece changed according to news events or cultural economies. (L. Hershman Leeson, personal communication, August, 2015)

> [A] lot of it was just being carried by the sea or by the river. It was taking me somewhere. I was not planning at all. (M. Neddam, personal communication, August 21, 2015)

> I'm more thinking in terms of discoveries, exploration, experimentation, research where you do not know. What you're searching is something that you do not know. So how can you have a strategy if you do not know what you are searching for? (M. Neddam, personal communication, August 21, 2015)

When Hershman Leeson was asked how online interactivity changes the relationships among the artist, the artistic process, and the work of art, she said that the process of creating online interactivity is like improvisation which involves unexpected encounters. As she stated in the interview, her first online chat bot work *Agent Ruby* "is unpredictable."

Along the same line as Hershman Leeson, Lozano-Hemmer described the concept of uncertainty in his social network piece *Friendfracker*. Uncertainty in *Friendfracker* comes from both software and the user. The software received permission from the user

and then randomly removed people on the user's Facbook friends list without notifying them. The user had the ability to either "re-friend" these people or keep them "unfriend" forever.

Neddam also stated that it is difficult to predict interactions in her art. For Neddam, the purpose of using online interactivity is to probe into unknown territories.

Global Reflection

The concept of global reflection discloses the artists' concerns about important global issues, such as surveillance. The artists have observed that the Internet society has evolved from a utopian democracy into a surveillance state. The artists' critical thinking about the world is translated into their artistic practices of online interactivity. Examples:

> Weibel and Manning had specific emphasis on art and security. (L. Hershman Leeson, personal communication, August, 2015)

> [I] focus *Weibel-/Manning* on surveillance and politics. (L. Hershman Leeson, personal communication, August, 2015)

> Artists have always been thinkers, have always been interested in how these technologies can actually be used for criticism, for politics, for expression, for poetry. I like to think about them a lot. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> Our contribution is just, instead of looking for suspicious individuals, to invert the logic of surveillance. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> We very much are interested in the idea that this project is not really an artwork. It's more like a campaign or like sort of an activist intervention. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> People wanted to share it in a very utopian way. (M. Neddam, personal communication, August 21, 2015)

> [It] really certainly gave me a holiday space that I would create a little thing for fun and the next day, it was visible and someone would see it and react to it, and the whole thing didn't cost much money. Everything was for free. The software to help you do it was for free. It was such a difference and such a utopia of reality. (M. Neddam, personal communication, August 21, 2015)

The examples here show that the artists are particularly concerned about massive Internet censorship. The artists reflect on the fact that governments support Internet control and cooperation survey markets. The artists express these important issues of Internet control, openness, operation, and privacy in the artistic process.

The interview excerpts above show Hershman Leeson's strong interest in surveillance societies. She frequently talked about her web-based works giving thought to political and civic issues of the Internet world, in particular *Weibel-/Manning-Bot*.

Lozano-Hemmer sees the role of the artist as a critical thinker who reflects on world issues. His work *Level of Confidence*, which memorializes the Mexican college students who went missing in the 2014 Iguala mass kidnapping, explains his artistic motif of using online interactivity. Lozano-Hemmer developed software with a face recognition ability that could search for the missing students. People were allowed to download the software and install it on their computing devices in order to participate in this impossible searching mission. For Lozano-Hemmer, this online project acts as an "activist intervention" from his view of exhibiting artworks in a traditional way. Lozano-Hemmer explains:

> For us, the more places that exhibit this piece, the more we remember the students. The more effective it is as a platform, for making present what is absent. I think it's the opposite of the normal artwork. In normal artwork what you want is, to create scarcity, you want to create this sense of aura, or of it being unique. You have this artwork that you can only see, if you go to MoMA or you can only see this, if you go to the Louvre.

Although Neddam did not speak directly to surveillance issues in today's world, she implicitly identified the idealistic essence of the beginnings of the Internet. She remembered that in the early days of the Internet, sharing was done "in a very utopian way." In addition, Neddam's artistic experience of online interactivity reflects the particular utopian spirit on the Internet. Compared to modern commissions to make art in public places, which come with numerous regulations, Neddam felt much more freedom to make interactive art on the Web.

Section Three: Forms of Online Interactivity Specific to Web-Based Art

This section explores forms of interactivity in the artists' creation of web-based art. The artists suggest online interactivity in their work far beyond clicking and moving a mouse on a screen. The key concepts *narrative* and *personalization* represent forms of online interactivity in the artists' web-based art (see Table 3).

Table 3. Key Concepts in Response to Forms of Digital Interactivity Specific to the Artists' Practices of Web-Based Art

Forms of Digital Interactivity Specific to the Artists' Practices of Web-Based Art	
Key Concept	Examples
NARRATIVE	"The quiz about *Mouchette* where I was comparing the film and my character. Of course, I didn't really care if people would click and find the good or the bad answer, but the fact that they were questioned and you had to choose one, the form itself, I saw it as a *narrative* form" (M. Neddam, personal communication, August 21, 2015).
PERSONALIZATION	"In the case of *Level of Confidence*, the personalization is basically, you standing in front of the work. As you are part of it, you share a diptych. There are two images, your own, and the images of the students, which get compared. You're personalizing that experience. I think that, that's a really important part of online culture is that, there is a contribution or a complicity that the person must have. Then the second-level of relationship is, personalizing the code itself, as I was describing. That, programmers can actually make it speak, or reflect on a condition that they have information or interest on" (R. Lozano-Hemmer, personal communication, November 11, 2015).

Narrative

The artists regularly emphasize that their web-based art involves a variety of narrative forms. For example, the user can have textual conversation and write something on the work's website to express their thoughts and feelings. Examples:

> [Users] create … a historical archive. (L. Hershman Leeson, personal communication, August, 2015)

> [People] could make their light designs and then write in their webpages because every light design would lead to a webpage. These webpages had comments and dedications and poems and manifestos that were completely uncensored. I was very proud of that, because at the time in Mexico, it was a big deal, not to be censored. (R. Lozano-Hemmer, personal communication, November 11, 2015)

Hershman Leeson's online chat bot works to create dialogue between bots and the user. These virtual bots learn new vocabulary and meaning during the online chat with the user. The information about the use of language is collected and stored on a server.

Lozano-Hemmer's description of his early Internet work *Vectorial Elevation* portrays various online communication performing interactions. According to the quote above, in addition to design searchlights, Lozano-Hemmer built a webpage on *Vectorial Elevation*'s website for the user to leave thoughts in written form and share with other users.

Neddam frequently emphasized in the interview that the use of language is essential to her artistic practice (see Table 3). When she began working with Internet technologies, she found that the process of creating web-based art is similar to that of traditional approaches. She said that creating interactive web-based art requires programming codes like using language in the computer world. When the work is launched on the Internet, interactions involve many different ways of narratives. For example, the interview excerpt above shows that Neddam uses a narrative approach to construct interactions in the work *Mouchette*. The user answers and reacts to these questions on the website along with their emotional feedback. Neddam saw this process of interactivity as performativity of language fulfilled by this narrative form.

Personalization

One of the interactions in the artists' web-based art allows the user to have personal access to the work. The user is given control to create and recreate the content of the work. Examples:

> I would say that, the way that [*Level of Confidence*] in general, the online economy and structure functions, is through a personalization. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> Maybe that's where I see the most important interactivity for creating this personality is the identification. When I say identification, I don't say that you become like them but you feel the same way they do… This identification in a way was, for me, the most important interactivity that people could identify to the character to the point that they would pretend that they were making the site or make the work as if they were the character. This happened long before so they were making this sort of spoof or fake *Mouchette* pages. Then I realized that this was the most important interactivity that they could act on. (M. Neddam, personal communication, August 21, 2015)

> When I created the character Mouchette, very soon the personality was being shared. That was an important part of *Mouchette* that I could share the personality. I made this work in 2001 where people can use her email and can also publish on the site. (M. Neddam, personal communication, August 21, 2015)

Lozano-Hemmer designed different personalized interactions in *Vectorial Elevation* and *Level of Confidence*. In *Vectorial Elevation*, Lozano-Hemmer used web-based interfaces and hoped to "spread the authorship, spread the origination of these light figures, across hundreds of thousands of people who participated." In a similar way, Lozano-Hemmer aims to reach the maximum amount of people in *Level of Confidence* in an optimistic hope of finding the 43 missing Mexican college students in the 2014 Iguala mass kidnapping. *Level of Confidence* allows the user to download and install the facial recognition software developed by Lozano-Hemmer. *Level of Confidence* integrates a series of personalizing interactions which occur on the user's own computing devices. The user first downloads and installs software. Then, the user sets up the digital camera connected to their computing device which facial recognition algorithms runs and overlays portraits of the user with photographs of the missing student.

Personalization in Neddam's practice is essentially connected with the user's appropriation of her virtual characters' identifications. For example, Neddam recounted the experience of "sharing online identifications" in the work *Mouchette* so that users

could "use [Mouchette's] email and can also publish on the site." What Neddam sees as more important in her practices of online interactivity is the relationship between interactivity and the user's appropriation of online identifications for extending the dialogue. In other words, what interactivity really means for Neddam is that users develop their own version of her work to continue sharing unique imaginations.

Section Four: Specific Techniques, Skills, and Technologies to Inform Online Interactivity

Section Four presents the artists' descriptions of technologies in realizing online interactivity in the artistic processes. The key concepts o*nline interface* and *code* illustrate the technologies used for the artists' interactive web-based work (see Table 4).

Table 4. Key Concepts in Response to Specific Techniques, Skills, and Technologies to Inform Online Interactivity

Specific Techniques, Skills, and Technologies to Inform Online Interactivity	
Key Concept	Examples
ONLINE INTERFACE	"I wanted to create something where people could personalize the public space. Doing an *online interface* to control the lights, allowed me to spread the authorship, spread the origination of these light figures, across hundreds of thousands of people who participated" (R. Lozano-Hemmer, personal communication, November 11, 2015).
CODE	"[The users] create action… through *code*" (L. Hershman Leeson, personal communication, August, 2015).

Online Interface

The artists described online interface as a medium of online interactivity. For example, web browsers and various screens of computing devices are essential to the artists' work. Examples:

> [The Web] is a very solitary experience, and it's also not neutral. It's based on our interfaces for participation. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> Even with *Mouchette*, I was collaborating with programmers to make these what people would call now blog spaces where this dynamic interfaces where you integrate the output of people. (M. Neddam, personal communication, August 21, 2015)

> You have to collaborate with certain craft, techniques, so this is what I try to do and on a one-on-one base. I work with a programmer. As I said, certain works made me search in toolboxes. For example, *XiaoQian* had a specific toolbox which was a sort of a narrative language made of little bits of text and little bits of pictures. (M. Neddam, personal communication, August 21, 2015)

According to the Internet culture, Lozano-Hemmer assumed that online interfaces establish individual participation as "solitary experience" in his words. Lozano-Hemmer's idea of "solitary experience" reflects the concept of personalization in forms of online interactivity described in the earlier section. Online interfaces in Lozano-Hemmer's practice create private, yet open interactions. For example, in *Vectoria Elevation*, the artist created a platform for interaction on website interfaces where the user had the ability to "control the lights" in an installation in a public square in Mexico City. Moreover, the user could write about and share their experience with other online visitors.

These two interview excerpts illustrate Neddam's artistic concern with using various web interfaces in her artistic process, including websites for interactivity in artwork and toolboxes for making art. For *Mouchette*, the artist created an online platform of exchanging thoughts and ideas similar to today's blogs. In addition, Neddam talked about her artistic attention to using work interfaces and toolboxes in her artistic process. The quote above shows how Neddam recounted the experience of creating the web-based work *XiaoQian*, in which she integrated images, texts, and links. Her aesthetic purpose in online non-linear narratives of mixing images and texts was to represent implementations of hypertext on the World Wide Web. In the process of creating

Mouchette and *XiaoQian*, Neddam, found that it was increasingly difficult to use the work interfaces and toolboxes of existing multi-media software on the Internet or on a desktop machine, for example Facebook and Photoshop. The excerpt below shows Neddam's reflection on the complexity of using multimedia-editing software.

> I always loved putting text over images, not next to images but over images. Let's say it's a mode of simple creating to add a text on top of an image. It's hardly possible on the net. Go to Facebook. Text is here, images there. Where can you, as a user, just add a text inside an image? Practically nowhere. You have to use Photoshop or non-Internet software to do that simple thing of mixing a text and an image on the same surface, so then creating another meaning which is neither the meaning of the image nor the meaning of the text but a different meaning of a text inside an image.

As a result, Neddam developed an interest in customized work interfaces. Her recent artwork, *MyDesktopLife*, presents an example of inventing multimedia-editing software for better toolbox interfaces. *MyDesktopLife* represents the artist's utopian vision of using software freely and not being limited by complex toolboxes. The following interview excerpt shows how Neddam's interest in customized designs of work interfaces have evolved over time.

> The possibility of creating your own page is more and more complex...I addressed programmers to create me a special toolbox. I've been continuing creating like this by having certain toolboxes designed for me because I thought, "Oh, I won't make a work with this specification." I can show you there are many works I did with *Mouchette* or with other [works], mostly with *Mouchette* where these toolboxes were needed to produce certain output. Now, one of my latest toolbox, I could say, this work that I had for *MyDesktopLife*. I found that I could share it and make that toolbox accessible for others.

Code

We all know that web-based art is technically created by programming codes. The artists recalled their artistic experiences of using online interactivity and provided more detailed descriptions of their technical processes. The artists would adapt existing and available technologies or develop new software to create web-based art. Hershman

Leeson and Neddam often work with computer programmers to fulfill their artistic needs. Lozano-Hemmer maintains a studio which has a team of computer engineers to work on his digital projects. The concept *code* is divided into two attributes: *inventing technologies* and *modifying existing programs*. Examples:

> Improv is the choices the bots make within the structure of the spine of their code. (L. Hershman Leeson, personal communication, August, 2015)

> It is work that can evolve and change, depending on which programmer does the programming. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> [The Internet] can become a medium to open new doors to people's imaginations. [The Internet] mixes content in a new way. Let's say it mixes text, images, and sound and all kind of things in a way where the user has to decode it and understand it in a personal way. It gives a freedom and it opens doors to the viewer. (M. Neddam, personal communication, August 21, 2015)

Hershman Leeson's quote above reveals that online interactivity is based on various web programming languages. She refers to computing languages as codes. Lozano-Hemmer acknowledged that programming is a basic and crucial structure to create interactive online work. Neddam's interview excerpt above reveals the relationship between online interactivity and programming codes from the user's input. Internet technologies enable the user's action of "decoding" and interacting with the work freely on an individual basis.

Inventing technologies. If existing software cannot meet the artists' needs, the artists can develop new program to realize their artistic ideas. Examples:

> I worked with 18 programmers on *Ruby*, most I never met except online. I was trying to prove it was possible. Among the people I worked with were Colin Klingman and he worked with me on *Dina* and Richard Wallace, who invented AIML. *Weibel/Manning* was completely different. I used Mark Hellar who archived *Agent Ruby* and a German woman to do these bots which in comparison to *Ruby*, were very simple. (L. Hershman Leeson, personal communication, August, 2015)

> [*Vectorial Elevation*] utilized a lot of different kinds of technologies which at the time were quite new. For instance, all of the servers and all of the client-side renderings of the online world was something that we developed. In 1999, there were very, very few ways to do 3D simulation, real time 3D simulation online, without downloading complex plugins. We managed to do this by programming it, straight in Java. As far as I know, my project was one of the very, very first times that a fully rendered, 3D virtual world could appear in a browser window. More importantly than that is that, this virtual world actually matched the real world. What we did is [that] we used GPS trackers, which by the way in 1999 they were not as available as they are now. Back in 1999, the Pentagon still removed the resolution that the GPS could do because GPS was a purely, military technology. We had to use a thing called Differential GPS to measure the location, the precise location of our searchlights, defeating the entire military encryption level that the Pentagon had, back then.
>
> Today, just any GPS unit gives you much more resolution because these limitations have been removed. Back then, matching the real world and the virtual world was a really hard thing to do. There was no such thing as Google Earth. So, anyway we had to build a virtual mode of the city. Then we had to make sure that, that virtual model matched, exactly what the real model did in such a way that, if you actually moved a searchlight in the virtual world, that searchlight would do precisely the same motion. Not hit like oncoming road vehicle traffic or somebody's window. Technologically, it was a nightmare, but in retrospect, we're quite proud of what we did. Of course, the project *Vectorial Elevation* has been done many times, after the original. (R. Lozano-Hemmer, personal communication, November 11, 2015)

Hershman Leeson recounted that she worked with different programmers online to create the two chat bot works *Agent Ruby* and *Weibel-/Manning*. Dr. Richard Wallace specifically invented AIML (Artificial Intelligence Markup Language) to create Hershman Leeson's first chat bot work *Agent Ruby*. In the interview, Hershman Leeson talked about the development of AIML in *Agent Ruby* and *Weibel-/Manning* created nearly fifteen years apart. She said, "We invented technologies [AIML] for *Agent Ruby*. *Weibel-/Manning* was very easy in comparison because the software already existed."

Quoting Lozano-Hemmer's response at lengthy response illustrates a rationale of developing new software to realize the artist's idea. Lozano-Hemmer recounted in details that his invention of software resulted from the practical reality of limited access to

digital and Internet technologies during the late 1990s. The first version of *Vectorial Elevation* in Mexico City required a navigation system of precise location and time which allowed users to design lights. However, previous digital technologies were not fully released due to political and military purposes. In order to provide accurate information and details of locating light designs in the installation, Lozano-Hemmer rewrote Java programming language to build and develop an online positioning system for *Vectorial Elevation*.

Neddam's great technological interest in software workspace led her to create new multimedia software by teaming up with programmers, for example her recent project *MyDesktopLife*.

Modifying existing programs. The artists adopt and adjust existing software to create their web-based art. They use open source software in general. Examples:

> It depends. If the technology is existing, if somebody else has already programmed it or it's an off the shelf solution, we use that. If, on the other hand, the goal cannot be achieved with existing programs, then we develop our own. Or, sometimes we just modify existing, either commercial or open source solutions. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> Suddenly, you realized that you could copy that little JavaScript. Yeah, you saw something. Let's say, Jodi has a funny shaking page. Then you were curious of how did they make it shake. You look at the source code and you think, "Hey, maybe it's that piece of the source code that does it." And then if you could identify it even when you are none technical, you can identify a little bit piece of transcript in HTML page. Then you put it in. That's how I did the screaming cat. I just stole a little piece of code and I put it in my page and then it made the cat, the picture of the cat jump and it was a Jodi, a piece of code I'd taken from Jodi. Later a lot of people would come to the cat page to steal the code and that was absolutely steal or use or take, whatever you want to call it. (M. Neddam, personal communication, August 21, 2015)

Lozano-Hemmer explained his choices of using existing technologies or developing software to create online interactivity depending on various project needs. Lozano-Hemmer adopts and adjusts existing programs from "either commercial or open source solutions."

Neddam's description of her experience of working with programming codes reflects that her approach was through learning and sharing codes with Internet artists such as Jodi and online users.

Section Five: Historical and Cultural Contexts in the Artistic Practice of Interactive Web-Based Art

Each participating artist in this study stated that early art and cultural movements influenced their practice of interactive web-based art, particularly in the twentieth century. Pioneers in the fields of art, literature, and culture became their muses. A primary concept, *precedents*, further explores the pioneers' liberal and forward thinking on the subject of the artists' practices of online interactivity (see Table 5).

Table 5. Key Concept in Response to Historical and Cultural Contexts in the Artistic Practice of Interactive Web-Based Art

Historical and Cultural Contexts in the Artistic Practice of Interactive Web-Based Art	
Key Concept	Examples
PRECEDENTS	"It's one of my passions, to think about *precedents* and inspiration" (R. Lozano-Hemmer, personal communication, November 11, 2015).

Precedents

The key concept *precedents* is composed of the two related key concepts *art* and *democracy* which represent pioneers in the different fields, including fine art and culture. The key concept democracy emerges unexpectedly and expands the original research question which focuses on the context of the history of art.

In a more-than-two hour Skype interview, Lozano-Hemmer frequently talked about the influence of art and cultural pioneers on his practice of online art. The quote in Table 5 shows his interest in pioneering ideas. These artists who have inspired his creativity are from early Latin American and Western art movements. When I directly

asked Lozano-Hemmer which early art ideas and movements influenced his interactive web-based works, he first responded with an affirmed statement of his belief in the historical context of ideas and views showed in the excerpt above.

Art. The influence of early art movements was regularly acknowledged in the artists' interviews, in particular the twentieth century. The artists mentioned art movements such as cubism, conceptual art, and performance art. Among others, the French avant-garde pioneer Marcel Duchamp's ideas were cited many times in the artists' interviews. The interview data show Duchamp's significant influence on the artists' practices of online interactivity. Examples:

> [The] cubists, thinking of things from all perspectives. Duchamp and avatars. (L. Hershman Leeson, personal communication, August, 2015)

> Then from Marta Minujín, there was couple of things that I loved. One of them is a very playful approach to the art work. The artists that I'm most interested in, both digitally and analogically, are artists who have an experimental approach, who don't pre-plan or preprogram what the outcome is going to be. Their result is something that is up in the air. The piece may fail completely or the piece may go in a completely different direction that the artist intended. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> I think everybody is influenced by Duchamp. It's the go-to guy, when it comes to the dematerialization of the art experience. Duchamp said many things that are very useful. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> It was within the tradition of happenings. This kind of experimental approach where, you don't really know the outcome, you're just preparing or presenting a bunch of eccentric conditions for people to then, make their own. To take it over, to complete their artwork, to actually read it and perform it is something that I think is really useful in the digital world. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> The attitude of the artist in the twentieth century is what they call avant-garde. I belong very much to this spirit of making art. (M. Neddam, personal communication, August 21, 2015)

> Conceptual art, of course. Art is a concept so you could say Marcel Duchamp is the father of conceptual art, art as an idea. Artists who work with language like Lawrence Weiner or Art and Language, these people

> influenced me very much because I was working with language myself. For example, Lawrence Weiner describes an object and writes the text on the wall and creates a conceptual sculpture in that way. I feel very related to that. In a way, I don't do anything different than that. (M. Neddam, personal communication, August 21, 2015)

In the second email interview, I asked Hershman Leeson about any art ideas in the history of art that have inspired her web-based art projects. Hershman Leeson responded concisely that the avant-garde cubists and Duchamp influence her practice of web-based art. In the excerpt above, Hershman Leeson provided some information indicating that cubism inspires her to "[think] of things from all perspectives" in her practice. It is interesting to see that Hershman Leeson cited Duchamp separately from cubists.

Both interview excerpts above present Lozano-Hemmer's interest in the unpredictable results that come from interactive digital art. That is, his artwork is defined by the user's interactions. When responding to my questions about where his influences of early art ideas come from, Lozano-Hemmer first mentioned the Latin American conceptual and performance artist Marta Minujin, who has influenced his practice. He connects Marta Minujin's artistic approach of play to this idea of unpredictability in interactive digital work. In addition, he also talked about western mainstream art ideas which play an important role in his practice, including Duchamp and happenings.

Neddam's academic training in linguistics drew her artistic attention to conceptual art. She said, "Artists who work with language like Lawrence Weiner or Art and Language, these people influenced me very much because I was working with language." Neddam found that working with codes in her web-based art is similar to working with language in conceptual art forms. In addition, Neddam sees Duchamp an essential figure who has influenced her web-based art. She admires Duchamp's idea of "art as an idea" which provides a foundation of conceptual art.

Democracy. The term "democracy" is derived from the artists' responses to the interview question about the influence of artistic historical contexts on their practices. When I analyzed data from the interviews related to the artists' practices of interactive

web-based art, a clear pattern emerged: All the artists frequently referenced being inspired by various social-cultural events and movements in France, the US, and Mexico.

It is interesting to see that the artists would all incorporated pioneers from fields other than fine arts. The artists consider liberal thinking as one of the important attitudes and manners in creating online interactive art. These cultural innovators, as Lozano-Hemmer repeatedly described activists, manifested and applied liberal ideas to the real world in the West and Latin America. The universal pattern of these liberal ideologies and thinking recognizes the importance of freedom of an individual's expression and opinions, which all of the artists emphasize in their practices of online interactivity. Examples:

> Free Speech, global access, democracy, in all of them. (L. Hershman Leeson, personal communication, August, 2015)

> Now, in the case of online media, perhaps of all the different digital media, online is perhaps, the most, how do you say, reduced. The reason for that is because, your interactivity is limited to the interfaces that have been designed, as we described, through a military genesis. Now, a corporate adoption. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> I am extremely interested for instance, in a group called the Stridentism [Spanish: Estridentismo], who were Mexican poets in the 1920s. People like Manuel Maples Arce, there's bunch of them. Now these poets, they were the very, very pioneers of radio broadcast technology in Mexico. The radio technology arrived in Mexico, thanks to these experimental poets. These poets had manifestos. For instance, one of the manifestos was called, Manifesto for Antenna-Man. This idea that the broadcast radio waves were penetrating our bodies that they were disseminating the poetry throughout was a very utopian and beautiful idea of relationship and experimentation. I like to think about them a lot. Like that, I have many other examples. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> Now of course, that was the early 1920s. Later, we know how radio was used, to manipulate people into the worst tragedies. But, I do like the idea that their commitment to this new medium was both poetic and political. [As] we work with online media, we have to be very careful that we do use it poetically, that we do use it politically. That's one thing that I would certainly take from the Stridentism (Spanish: Estridentismo). (R. Lozano-Hemmer, personal communication, November 11, 2015)

> Utopia spirit of media that every receiver can be a sender was so extraordinary and I did feel it like this and experienced it like this. (M. Neddam, personal communication, August 21, 2015)

> I could really enact and use all my experience in the performativity of language, and also how to shape a narrative in very strange forms. Also, one of my influences is a number of writers called the Oulipo. (M. Neddam, personal communication, August 21, 2015)

> [Oulipo] were giving each other certain rules on language. For example, how to write a text that doesn't have this particular vowel. Not so much on the content but on the form of the language in itself. Of course, their way of thinking is reading very fit to computers, but computers didn't exist in that time in the 1960s. People didn't use computers in the 1950s and the 1960s. That's where it started. People didn't use computers but their way of using very special, creating narrative from using the form of language rather than its content. Let's say letters, or … is something that really also influenced me. (M. Neddam, personal communication, August 21, 2015)

Hershman Leeson constantly related her interest in censorship and surveillance when discussing her recent bot projects supported by ZKM. In first email interview, my question about the context of art history for Hershman Leeson was:

> In many interviews, you have told that your practice is influenced the civil liberties movement in the 1960s on the West Coast. You also mentioned that particular art ideas and artists from the history of art inspires and influences your early are-making process. What early art ideas and movements in the history of art influenced your web-based works? Would you provide some examples of your web-based artworks and their related early artistic ideas?

Surprisingly, her initial answer was the influence from major socio-political movements and issues (e.g., censorship and human rights). Her two chat bot works reflects on surveillance through online interactivity as she stated in the interview. I clarified the question in the second email, and then she talked about inspirations from the history of art.

Lozano-Hemmer's interview excerpts above reveal that the artists' realization of online interactivity reflects the gradual evolution of the Internet society from utopic expectations to surveillance and commercial desires. Lozano-Hemmer's quotes above impart a better understating of how the influence of cultural and political reflections is

transformed into aesthetic elements in the pioneers' artistic processes. For example, Lozano-Hemmer explained the cultural context when he created *Vectorial Elevation* in the late 1990s. He says:

> [In] 1999, nobody, we had, had years of Internet. There was a lot of promise about empowerment, and there was a lot of promise, and almost naive presentation of the online world as truly allowing us to be democratically represented. If you were a racial minority, you could pretend not to be. Gender, you could also become anonymous and all these things, which of course, turned out to be ridiculous. At that time, there was all of that discussion. *Vectorial*, what it tried to do is, tried to take a pretty, almost fascist technology like searchlights. Traditionally, searchlights were used for military, aircraft surveillance. They were used by the Nazis, for huge spectacles of power. This is a technology that already is very dark, and it has this ominous background. The Internet itself was coming from Pentagon research, on control and communications in the battlefield.

In addition, Lozano-Hemmer provided an example of his influence from outside fine art. He talked about the Mexican avant-garde group Stridentism, which was founded by poets, artists, performance artists, musicians, and photographers in the 1920s. This interdisciplinary group Stridentism exemplified the transmission of communication information through poetry on air. Lozano-Hemmer is inspired by the Stridentism's socio-political practice and their approach of using radio broadcast technology. The Stridentism's liberal actions on air, for Lozano-Hemmer, reflect the artistic practice of online media.

Neddam's statement "Utopia spirit of media" on the Internet shows a common belief in the early stages of public Internet access in the 1990s. In addition, Neddam talked about her appreciation and influence from Oulipo, which was founded by writers and mathematicians in 1960. Oulipo explored new insights in writing by restrictions of language rules, for example using a single vowel to write a poem. The influence of this literary movement links to her linguistic background and her interest of "performativity of language." In Neddam's view, Oulipo's approach of writing in restricted rules presents a forward-thinking model of computer language. Oulipo's practice of "creating narrative

from using the form of language rather than its content" inspires Neddam's web-based art which presents interactive non-linear narratives.

Section Six: The Artistic Experience of Online Interactivity and Studio Pedagogy

This section explores the connection between the artists' practices of online interactivity and their pedagogies. The interview data regularly shows that the artists' artistic experiences of online interactivity directly or indirectly influence their pedagogies, including conceptual and practical matters. The key concept of *artistic experience of art* is illustrated by related concepts of *practical advice*, *not my work*, and *art history* (see Table 6).

Table 6. Key Concept in Response to the Artists' Artistic Processes of Online Interactivity and Their Pedagogies

The Artists' Artistic Processes of Online Interactivity and Their Pedagogies	
Key Concept	Examples
ARTISTIC EXPERIENCE	"I think by creating a spirit of dialogue and exchange, you teach much more about online interactivity than by a use of technology. What I want to say is that *my experience* of online interactivity taught me the idea of dialogue (M. Neddam, personal communication, August 21, 2015).

Artistic Experience

The concept *artistic experience* describes how the artists' artistic experience of online interactivity is indirectly transformed into their pedagogies. Examples:

> [Keep] changing things with the times, invent technology. (L. Hershman Leeson, personal communication, August, 2015)

> I had this group of artists whom I basically transferred a lot of information on how, technically, we accomplished each one of the art works. That is something that I also wish that I had had when I was younger. Somebody who can share with you some of the methods, and algorithms,

> and strategies to develop technology based art works. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> I think for me, this is the best thing I can teach, is to show them that the meaning of the work they make is completed by a viewer and by how a viewer can invest in it. This would be my idea of how can you teach interactivity by showing that a work of art is completed by the viewer. (M. Neddam, personal communication, August 21, 2015)

When asking Hershman Leeson what perspectives she would provide when teaching online interactivity, her response to teaching toward pedagogy echoed her own artistic process: keep up with the rapidly changing world of technology and create an innovative idea. For example, the computing scientist invented a new program for Hershman Leeson's first artificial intelligence web chat bot work *Agent Ruby* in 1998 to realize her forward thinking ideas. Nearly two decades later, based on *Agent Ruby*'s software, she developed *Weibel-/Manning-Bot* from 2014 to 2015.

Lozano-Hemmer believes that his teaching approach is based on sharing his past artistic experience. The direct input of Lozano-Hemmer's artistic experience is often structured by talking about practical and technical matters of *making* digital art. He recalled, "I basically transferred a lot of information on how, technically, we accomplished each one of the art works." Lozano-Hemmer's rationale of sharing his experience is revealed in the excerpt above. During his early career, he felt that there could be support of technical and practical advice.

Neddam frequently expressed that her practice of online interactivity is itself teaching through "ongoing conversation." As Neddam described, creating online interactivity is designed to "[open] a conversation, which is an ongoing conversation with one viewer and many viewers, and many viewers." The interactive process of multiple online users' dialogic exchanges further completes the art work. The concepts of the user's acts of creating conversation and completing the work by the users were explored in the earlier section the "Strategies for Online Interactivity" in this chapter.

Practical advice. When it comes to studio teaching, the artists recognized the importance of practical matters in creating art, in addition to the students' conceptual frameworks. According to the artists' descriptions, practical issues involve various issues, such as finance, technologies, and emotions. Examples:

> To get people to believe in themselves, and stop being afraid and to laugh more. (L. Hershman Leeson, personal communication, August, 2015)

> They won't make money or be able to live. (L. Hershman Leeson, personal communication, August, 2015)

> I am very interested in the processes that can allow an artist to sustain him, or her, self as an independent autonomous unaffiliated artist. I give a lot of very practical advice financially in terms of management, in terms of organization, in terms of preservation, in terms of team building because I think that's a big taboo in the art world. People don't want to share and talk about money, but I love talking about it because it's not that I love money, which I do, but it's not that. It's more that it is only thanks to the fact that I can maintain my studio overtime, that I can remain independent. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> Remember a particular case of a student who was working in installation in spaces, modifying certain things or adding some elements? You found out because he was very handy. You found out with his phone. He could do sort of what they call augmented reality with layers. He downloaded the program and then he could do a certain number with this with layers with his phone. He was doing it by himself because he was smart and it fitted exactly the kind of things he was trying to do like altering perspectives in space by adding some visual analogs. I was encouraging him to continue using this virtual reality software that he found. (M. Neddam, personal communication, August 21, 2015)

Hershman Leeson's interview excerpts reveal art students' anxiety and fears of practical matters in their career, in particular financial needs. Hershman Leeson encourages her students to stay positive along the way.

Lozano-Hemmer's belief in being "an independent autonomous unaffiliated artist" is transformed into a process- oriented teaching concept. As a result, he would provide information about practicality.

The excerpt above is Neddam's articulation of a story about her student's process of creating an interactive digital project. During the process, the student experimented with different program by searching online. In this case, Neddam did not tell the student the exact technologies to use and try, because the student learned technical issues mostly on his own. Neddam would support the student's idea and exploration of software online when the student was going in the right direction. She said, "I was encouraging him to continue using this virtual reality software that he found." Neddam's story shows that the instructor would offer technical advice and information to students during their art-making process.

Not my work. Each artist claimed that he or she did not teach their own work as academic subjects. In fact, the concept not my work indicates that the artists assist students in realizing their projects by sharing their own past artistic experiences. Examples:

> I don't teach my own work. (L. Hershman Leeson, personal communication, August, 2015)

> [Most] of my approach for teaching is either illustrative, so I basically go over my work, and my obsessions. It's not about useful. It's just more like a panorama. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> I kept [teaching] very, very separated. First one, the reason why I kept it very separated from my teaching practice was the anonymity, you could say. But, that was not the main reason, because I could tell *Mouchette* was done anonymously. That was a very important element that nobody could access the maker behind the work of art. I didn't even mention it in the art school where I teach because people look down on it. (M. Neddam, personal communication, August 21, 2015)

When I asked Hershman Leeson about her artistic experience of incorporating any specific work into her teaching, she simply gave the name of the works, "*Agent Ruby*, maybe *Synthia*." Here is the interview excerpt from the first email conversation:

> Chia-Ling Lee: Can you describe any of your specific interactive web-based projects which are translated and transferred into your teaching content?
>
> Lynn Hershman Leeson: *Agent Ruby*….

In the second email interview, I asked her further about how she incorporates the work *Agent Ruby* into her teaching, she gave a clear statement, "I don't teach my own work." Hershman Leeson's answer reveals that she did not deliver her works to students as curriculum materials which students would be required to study. I found interesting nuances between these two answers. Hershman Leeson's interview response indicates that the artist's past artistic experience is transformed into a conversation with the students. What specific experience is translated and delivered depends on each student's artistic process.

In Lozano-Hemmer's interview, he used the word "panorama" to describe the intention of sharing his production experience of online interactivity. His response indicates that the reference of his art in his teaching is more like an information exchange instead of curriculum materials.

Neddam's interview excerpt shows that she did not include and cite her work in teaching due to a suspected attitude toward online art in academia and the anonymous nature of her web-based work. However, she would guide her students to achieve their best by encouraging them.

Art history. The artists strongly advise art students to study related ideas and concepts which have been created and explored in the history of art. Examples:

> I just ask them to dream more of what has not been done. (L. Hershman Leeson, personal communication, August, 2015)
>
> I would suggest for people to read art history, and to study these precedents, and to understand themselves not as someone who is original, but someone who comes from a tradition of experimentation. (R. Lozano-Hemmer, personal communication, November 11, 2015)

Hershman Leeson and Lozano-Hemmer encourage art students to study historical examples related to their projects to help create something truly original. By researching historical cases, art students learn to be less naïve and know what was done and "what has not been done."

Section Seven: Instructional Strategies Relating to the Artistic Practice of Online Interactivity

This section focuses on the artists' instructional approach of teaching. According to interview data, their teaching usually involves conversations on solving problems during students' process of making projects. The two primary patterns of instructional strategies are found: *problem-solving* and *dialogue* (see Table 7).

Table 7. Key Concepts in Response to the Artists' Instructional Strategies Relating to the Artistic Practices of Online Interactivity

The Artists' Instructional Strategies Relating to the Artistic Practices of Online Interactivity	
Key Concept	Examples
PROBLEMS-SOLVING	"It's the same thing, create a flow chart, set of *problems*, then *solve* them together" (L. Hershman Leeson, personal communication, August, 2015)
DIALOGUE	"To make certain there is an extended *dialogue*" (L. Hershman Leeson, personal communication, August, 2015)

Problem-solving

The artists often taught based on individual art students' projects. Interview data shows that the artists often focused on student-leading and problem-centered approaches. Examples:

> I am happy to share that information [of the methods, and algorithms, and strategies] a lot too. It went really well, and it's also really good for me because I also learned what they are using, and how they are approaching a

> problem. It's a nice two way experience. (R. Lozano-Hemmer, personal communication, November 11, 2015)

> I just help them make what they do. In that sense, I wouldn't teach them. (M. Neddam, personal communication, August 21, 2015)

Hershman Leeson works with art students together to solve problems related to their individual project. Hershman Leeson's response to teaching strategies leads me recall a question about her strategies for creating online interactivity earlier in an email interview with me.

> Chia-Ling Lee: How do you strategy and conceptualize those pre-program ideas in your art-making process of web-based art, for example *Agent Ruby* and *Weibel-/Manning-Bot*?

> Hershman Leeson: I get an idea and then try many things to make it work, then keep changing it till it works well.

Hershman Leeson's two responses to her students' and her own processes indicate that the nature of problems-solving is essential to art-making. An instructor, for her, teaches art students to find solutions to problems in the artistic process.

Lozano-Hemmer recalled from his teaching experience that he would like to understand art students' problems and approaches during their process. He believes that sharing his artistic experience with students helps students to realize their artistic and conceptual goals. Teaching through understanding students' issues and sharing his experience, for Lozano-Hemmer, is an interactive experience.

Neddam expressed that her teaching provides art students assistance in developing and implementing their projects.

Dialogue

The artists emphasized the importance of conversational exchanges in their teaching. Conversations take place among the artist, students, and peers. This conversational approach presents an interactive experience of teaching. Examples:

> I really, genuinely, think a lot of what makes good art is not something that can be transferred in a lecture." (R. Lozano-Hemmer, personal communication, November 11, 2015)

> I teach in the Fine Arts department. You don't teach a medium. I teach critique, but I don't teach a medium. I don't teach them how to paint, or how to sculpt, or how to make a performance. (M. Neddam, personal communication, August 21, 2015)

> That sense of dialogue, that sense of conversation, ongoing conversation is for me what the best thing you can learn from it and the best way you can teach. (M. Neddam, personal communication, August 21, 2015)

Hershman Leeson discussed creating and having a continuous conversation when asked about her instructional strategies (see Table 7). Her response indicates that dialogue is one of the most important elements in her teaching.

Although Lozano-Hemmer did not directly point to dialogue as a teaching method in the interview, the interview data shows that he shared his thoughts and learned art students' problems in their creative process. Most studio art courses are based on student-centered learning (Barrett, 1988; Heywood, 2009). Each art student usually works on an individual project during the course of a class. The excerpt above indicates that lecture, in Lozano-Hemmer's view, would not properly transmit artists' creative thoughts or ideas in the art-making process. Lozano-Hemmer emphasizes the importance of dynamic discussions on art-making between the instructor and art students.

The two excerpts above show that Neddam's teaching method focuses on criticism through verbal communication. She used the words "critique," "dialogue," and "conversation" to describe the activity of critique with art students as involving dynamic conversations among the instructor, the student, and the student's peers.

Chapter VI

DISCUSSION

The purpose of qualitative research is to "understand the perspectives of those involved in the phenomenon of interest, to uncover the complexity of human behavior in a contextual framework, and to present a holistic interpretation of what is happening" (Merriam, 2009, p. 215). This study's interview data showed that thematic categories in this study are interactive, organic, and contextual. As a result, rather than attempting to define this perpetually dynamic relationship, this chapter aims to capture and describe a contextual relationship between the participating artists' practices of online interactivity and their teaching experiences.

Merriam (2009) suggests that "reality is holistic, multidimensional, and ever-changing; it is not a single, fixed, objective phenomenon waiting to be discovered, observed, and measured" (p. 213). This study adopts Merriam's approach of holistically analyzing and measuring collected interview data, and this chapter illustrates, interprets, and translates comprehensive contextual dimensions of each key concept discussed in Chapter V.

The seven thematic categories which respond to the study's research questions described in Chapter V are: (1) the role of interactivity in the artistic process of web-based art; (2) artistic strategies for creating online interactivity; (3) forms of online interactivity specific to web-based art; (4) specific techniques, skills, and technologies to inform creating online interactivity; (5) historical and cultural contexts in the artistic

practice of interactive web-based art; (6) the artistic experience of online interactivity and studio pedagogy; and (7) instructional strategies relating to the artistic practice of online interactivity.

By analyzing the collected interview data, this chapter identifies interconnections and distills the original seven thematic categories into four compound themes by developing and crystallizing them. The four distilled themes are discussed in the following sections: (1) Strategies for building online interactivity; (2) Digital technologies for forms of online interactivity; (3) The influence of 20th century artistic and cultural contexts; and (4) Reflection in teaching.

In order to connect the artists' artistic and teaching experiences, I begin by exploring their artistic and conceptual practices of online interactivity. Sections One through Three in this chapter deeply scrutinize the artists' artistic processes of online interactivity. Their nearly two-decade experiences in this field provide a foundation for us to understand what is required to create interactive web-based art. Subsequently, in Section Four, this understanding of the artists' artistic processes may help us probe the influence of the artists' experiences on their teaching.

This chapter presents interpretations of the findings by thinking through a complex interplay between each key concept defined in the previous chapter. Following Merriam's suggested approach to data analysis, this chapter aims to "[move] from concrete description of observable data to a somewhat more abstract level [involving] using concepts to describe phenomena" (Merriam, 2009, p. 188). After the process of conceptually blending regular patterns in the artists' interview responses to this study's research questions, I relate these abstract concepts to one another. This chapter "[captures] the interaction and relatedness of the findings" (p. 189).

Each of the four sections below presents a descriptive narrative of compound connotations based on evidence in the interview data. The goal of this chapter is to

deliver understanding and insights derived from the artists' narratives of creating online interactivity and teaching studio courses.

Each section includes cross-case analysis and discussions. Beginning with a cross-case lens, the first part of each section emphasizes comparisons across the participating artists. The cross-case analysis in this chapter is structured around similarities and differences among the artists' artistic and teaching experiences. The subsequent discussion further relates and integrates the interview data articulated directly by the artists and relevant literature in order to learn more about the complexities of online interactivity in the artists' artistic processes and in their studio teaching.

Roles and Strategies for Building Online Interactivity

In analyzing the artists' respective interpretations, I bring to bear both of my thematic categories detailed in Chapter V, including the role of, and strategies for, online interactivity, in order to theorize the fundamental artistic processes of online interactivity. According to the interview data, the role of online interactivity in the artistic process presents the artists' definitions and ideals about conceiving and creating interactivity. The so-called "strategies" for online interactivity used by the artists in this study do not refer to fixed plans or the achievement of some great work of art in the traditional sense. Rather, they use artistic strategies for building their ideal forms of online interactivity. The interview data shows that using the word *approaches* aptly describes the artists' strategies for online interactivity.

Neddam finds difficulties linking the word "strategy" to her practice. She explains, "Strategy makes me think of a general in a battlefield or something but you can plan." According to Neddam, the essence of creating interactive online work is openness. As a result, she declares that interactivity in her work relates to building a field where the users customize their interactions on an individual basis. Neddam cannot predict results of the

users' interactions. Her poetic metaphor of a boat floating on the water freely, following the flow, symbolizes uncertainty in her artistic process of online interactivity. That is, creating online interactivity, for her, does not mean to achieve pre-determined interactions. Her online platform allows open and unpredictable interactions to happen and continue outside her online space (work). She explains:

> It's hard for me to think of it in terms of strategies. Really. I don't have the feeling. Strategy makes me think of a general in a battlefield or something but you can plan. I don't believe that idea of … I'm more like when I make these works, I'm more like a little boat floating on the sea so some of it. I can steer and some of it. I just have to go where it takes me. It takes me somewhere. It's so much bigger than me that the best thing I can do is to observe where the wind is, where the currents are, and to let myself be taken but I don't do it blindly of course. I can steer it a bit in my way…This interactivity is also how the wind blows.

Neddam's illustration above shows that the artists' intentions of creating online interactivity emphasize the experience of the user, not the objecthood of the work. As a result, the artists' strategies for online interactivity operate more like approaches that involve digital technology, culture, and politics. The ultimate goal is to let the users spontaneously create relationships between the users.

In Figure 15, the three columns demonstrate the relationships between the roles of, and strategies for, creating online interactivity. Column A shows the two original research questions in this study. Column B depicts the seven key concepts which emerged over the course of my findings. The seven key concepts are grouped into three compound meanings. The arrow between column B and C reveals that the three groups of new compound meanings in column B form the foundation for the artists' artistic language of online interactivity in column C.

The first compound meaning in column B in Figure 15 shows both the key concepts *active participation* and *relationship* emerging from the thematic category of the role of online interactivity in the artistic process, as well as the concept *collage of users* arising in the thematic category of the strategies for creating online interactivity. I group

the three concepts active participation, relationship, and collage of users together because the concept of collage of users forms the inter-connective tissue between the concept "active participation" and the concept "relationship." Another compound group includes the three concepts *freedom*, *uncertainty*, and *global reflection*. This new concept group explores the nature and meaning of online interactivity in the participating digital media artists' artistic processes.

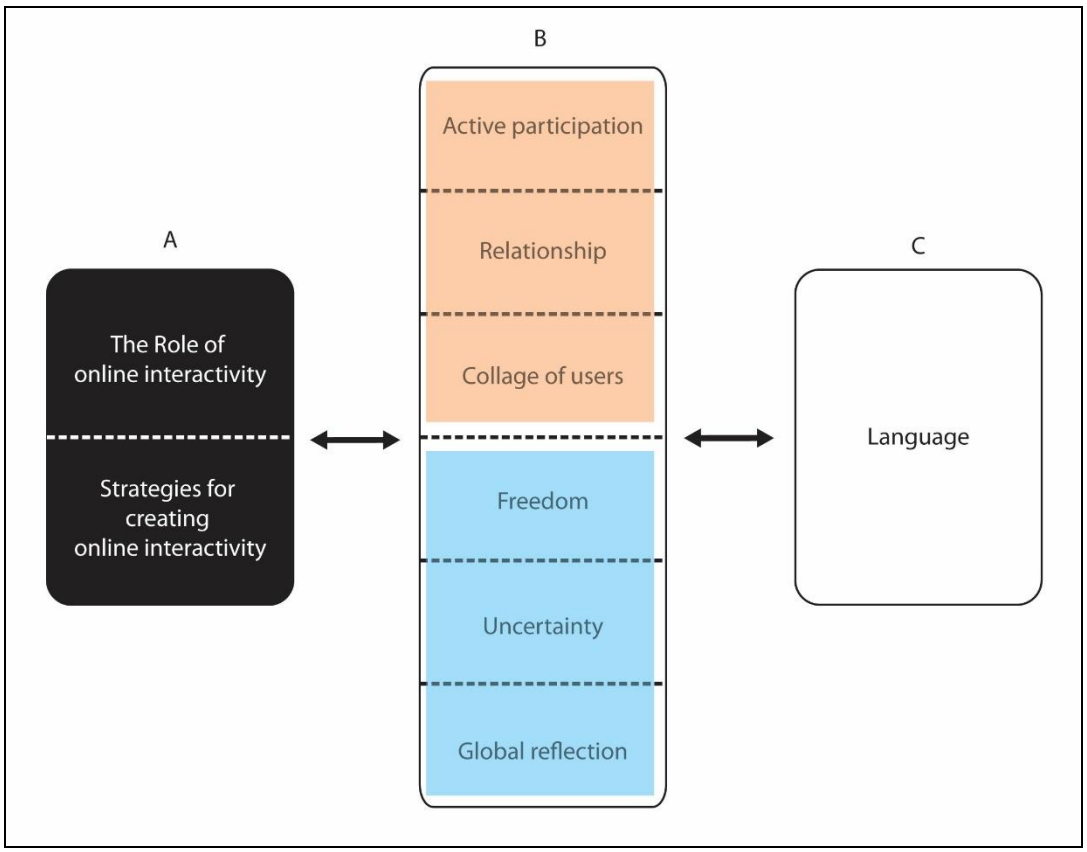

Figure 15. Compound Meaning of Roles and Strategies for Building Online Interactivity

Contextualization by Users

One of the primary purposes of creating online interactivity, according to the artists' descriptions, is that the input of online users contextualizes the work through interactions. For example, Hershman Leeson believes that users' conversational engagements are required to enrich her chatbot works. Additionally, Lozano-Hemmer

emphasizes the importance of interactivity generally in finalizing the work by explicitly incorporating the user's participation. Similarly, in Neddam's practice, the concepts active participation, relationship, and collage of users all refer to a process of sharing creative ideas among users.

The artists collapse the traditional distinction between *viewer* and *user* from the technological perspective. This concept, in which the traditional distinction between *viewer* and *user* is blurred, allows me to make a new compound meaning and exemplify the interrelationship among the original key concepts defined in thematic categories of the role, and strategies for, online interactivity. That is, in the interactive process, active participations form a relationship by a collage of users.

In addition to the term "the user," Lozano-Hemmer interchangeably refers to the traditional viewer as "the participant," the public," and "the actor," all of which indicate an active role for the viewer in his interactive online work. In the same way, Kluszczyński (2010) uses the term "participants, performers, executors, or (co)creators of an artwork-event" to describe "participative behavior of the audience" in interactive art (p. 2). Lozano-Hemmer sees that users in his work expand the content of the work itself.

Hershman Leeson and Neddam identify the viewer with the user in their web-based works based on browsers and web technologies, which enables the viewer to engage and participate. Hershman Leeson does not even use the word viewer to describe her artistic experience of the chatbot works, but only to a user. Indeed, she believes that interactive web-based work is possible only because Internet users nourish the work.

In addition, Neddam believes Internet technologies have enabled the viewer to act as a sender as well as a receiver. Although in the interview Neddam does not use the word receiver to describe the viewer, her idea of the receiver parallels the term *the recipient* in Kwastek (2013) and Kluszczyński (2010). Kluszczyński characterizes interactive art as "scenarios or scores that project the interactive behavior of the receivers, thus projecting the dynamics of the changeability of an artwork-event" (p. 2). The user's unrestricted

involvement in the process of interactions result in contextualization and the nature of openness in the work itself, as the artists note.

The form of web-based art dynamically shapes and changes over the course of the interactive process in ways the artist cannot predict. As Kluszczyński (2010) observes, "An artist does not make a final, completed piece of art, instead [the artist] produces an area of activity for the receivers, whose interactive actions bring to life an artwork-event" (p. 2). Although the artists express that their interactive work is unpredictable and uncertain, and that they do not expect the users' interaction, one of the artists' aims is for the user's experience to contextualize the work itself.

The Nature of Openness

Grouping the two key concepts *freedom* and *uncertainty* together may further explore the key concept *open work* which emerged and was defined at length in the previous chapter. The key concept of freedom originates from the thematic category of the role of online interactivity in the artistic process. The concept "uncertainty" emerges from the thematic category of the strategies for creating online interactivity. The words *freedom* and *independence* recur frequently in the interview data which describes the user in the artists' work spontaneously expanding the content of the work beyond the artists' expectations.

The artists' enthusiasm for creating open and free interactions is found in Kwastek's (2013) discussion of human actors in interactive art. She says, "Many artists emphasize the need for openness or willingness to relinquish total control" in the work (p. 92). Similarly, American media theorists Jay Bolter and Richard Grusin (1999) believe that the concept of the user's control which is a primary cultural attribution of digital media lies in "an operational sense." In regards to the nature of openness, Kwastek observes the relationship among the role of the artist, the recipient (the user), and its efficient system of interactions during the artistic process. She sees that the artist and the

user receive and mediate in different stages of the interactive system in a work in order for it to run smoothly

Similarly, Greene (2004) suggests that Internet artists create "open works" to use her term, supported by Internet technologies since these allow the user to change and modify artistic elements in the work. In addition, according to Kluszczyński's (2010) definition of "the strategy of rhizome" which is "multidirectional, endlessness, and unpredictability," the nature of openness in interactive online art creates "development and expansion beyond their current limits during an interactive experience," (pp. 15, 17). The interactive and dialogic nature of Internet use and intentions of the artists allows the users to build contents and contexts of the work in the process of interaction.

The process of interaction. The form of an interactive work is finalized by *the receivers-participants*, to use Kluszczyński's (2010) phrase, in which the artist creates an online space in which random user participations form the content of the work (Kluszczyński, 2010; Kwastek, 2013). Both media art scholars focus on the user's interaction but do not draw many connections between the artist's artistic approach and their realization of interactivity. This study seeks a deeper understanding of the respective artists' motivations and rationales for decisions to work with online interactivity in the artistic process.

Lozano-Hemmer frequently states that the effect of freedom in his practice produces unexpected results in the work. He sees his work maintain an unfinished form until the user's interactions are incorporated. According to him, the freedom endemic to open work allows the user to create individual activity and produces collective interactions in the work.

Similarly, Neddam states that her work allows the user to freely interpret her artistic concepts and even transforms her work into a new medium. In other words, the user's interactions, as Neddam illustrates, are a series of the user's interpretations within Neddam's original narrative in various browsers. Both Lozano-Hemmer and Neddam's

artistic intentions for the user's free interactions are "invitations to select, manipulate, or generate information or configurations" (Kwastek, 2013, p. 168).

Neddam often emphasizes that, for her, interactivity is sharing and exchanging online users' imaginations through the users' decoding actions of the original code. Neddam creates an online platform where dialogue among users occurs and grows. The users can employ their interpretations and narratives to modify Neddam's original narrative and create the user's own version of the work which sometimes is an entirely new website. Neddam consider the users' reinterpretations as continuing a dialogue with her work. As such, "experience creation" and "constructive compression" as used in Kwastek's (2013) analysis of types of communication approached in interactive art provides Neddam's artistic process with a theoretical context. According to Kwastek, the user "can be encouraged to elicit something new from a system" which she terms experience creation (p. 130). In addition, another Kwastek's concept, "extradiegetic processes," which is defined as "[locating] externally to the narrative" explains interactions in Neddam's work (p. 131).

In addition, the concept of freedom is also associated with operational views in the interactive process. Kwastek (2013) describes the concept of "freedom of choice" in hypermedia-based systems which allows the user to freely select links of texts or graphics which produce expected interactions. The concept freedom of choice, which originates from commerce, seemingly provides a theoretical foundation for the freedom of choice that accompanies hypertexts in the artists' web-based art. Kwastek observes that in commercial systems, the user receives a hint of where hypertexts directs to the next action. However, most of the artists' web-based projects actually do not provide information about the effects of clicking hypertexts. Similarly, Lozano-Hemmer's comments on freedom in his practice echoes Kwastek's observation of freedom of choice. He says, "It's something that we should recover, that possibility for the artwork to be

surprising." Neddam's work provides many unclear purposes of clicking which enable the user to freely roam and experience based on each individual's free choice.

The artistic process of interactivity. Neddam states that working with online interactivity gives her a great freedom of creation. Neddam says, "You lose all kind of freedom in these heavily commissioned artworks and also in the physical public space. It's so full of rules that even putting a little thing on the pavement, nothing is allowed."

Also, the concept "freedom" explains the artists' conceptual thinking, which I have termed "global reflection." The artists use online interactivity to advocate for civil freedoms in today's surveillance society and to demonstrate this commitment to civil liberties in the free platform of web-based art. For example, Hershman Leeson and Lozano-Hemmer's statements frequently stress socio-political concerns to better inform their artistic approaches to creating interactions within the work. In particular, surveillance and censorship recur in Hershman Leeson's *Weibel-/Manning-Bot* and Lozano-Hemmer's *Vectoria Elevation Level of Confidence* and *Friendfracker*. Hershman Leeson and Lozano-Hemmer conceive of their approaches for realizing their ideals about globalization and surveillance, engaging more users, and finding appropriate technologies and techniques.

As Kluszczyński (2010) observes, such strategies for interactive art are built upon on cultural participation, most relevantly "the strategy of the network" which "creates, shapes, and organizes relationships that link the participants of an artistic event" (p. 21). "The strategy of the network" is defined by one of his observed eight strategies for interactive art. The artists reflect on social-political concerns when online activities are monitored for various purposes for homeland security and marketing (Bolter & Grusin, 1999; Green 2004, Manovich, 2001; Ziarek, 2004).

The Language

I would like to conclude this section with the concept *language*. The artists often conceptually and artistically treat online interactivity as an open, rather than determinate medium, in their artistic processes. In other words, online interactivity is one of many artistic languages used in their practices. For example, Lozano-Hemmer constantly characterizes the use of online interactivity and digital technologies as essential to his practice, as I demonstrated in Chapter V. Interactivity, for him, is media which connects his utopian vision of the world with each user. Without online interactivity, Lozano-Hemmer could not have become an artist.

Moreover, in regard to reaching an audience, Lozano-Hemmer argues that the use of Internet technology as a contribution to "maximum dissemination of the project." Lozano-Hemmer often uses the word "dissemination" in the interview to indicate a desire that online interactivity and Internet technology enable his projects to reach as many online users as possible.

Although Neddam was not as explicit as Lozano-Hemmer in describing her artistic language, she states that her practice of online interactivity creates entire situations, which relates to Duchamp's idea of *readymades*. The reason she explicitly subscribes to Duchamp's idea is to "change the way the viewer envisions or receives a work."

Digital Technologies for Forms of Online Interactivity

This section discusses technologies used to create online interactivity. The artists I interviewed gave responses to my questions about specific technologies used to realize their particular projects. I was expecting them only to provide the names of software they had used, such as Flash, JavaScript, HTML, Photoshop, Processing, Max MSP, etc. However, they shared many details about their artistic processes, in which their first step was to design specific interactions to reflect their artistic concepts and concerns, and then

to develop technologies for realizing the "design." Their detailed descriptions provide a foundation that connects my two sub-research questions: (1) what forms of online interactivity might be specific to the three selected digital media artists practices? and (2) How do specific techniques, skills, and technologies inform online interactivity in the three selected digital media artists' artistic processes?

In Figure 16, Column A shows the two aforementioned research questions in this study. Column B shows two technological solutions discovered in the interview data, including code and interface which are essential to online interactivity. Column C reveals forms of interactivity realized by technological solutions. The arrows between each column display a reciprocal relationship through the process of recursion. For example, technologies used for realizing an artistic concept (Column A) decide compositions of code and relative models of interfaces (Column B), which customizes interactions (Column C). Interaction feedback in Column C affects the existing code and interface in Column B. As a result, forms of online interactivity may continue ever-evolving in this process of interaction. This reciprocal relationship can reverse and loop in between columns.

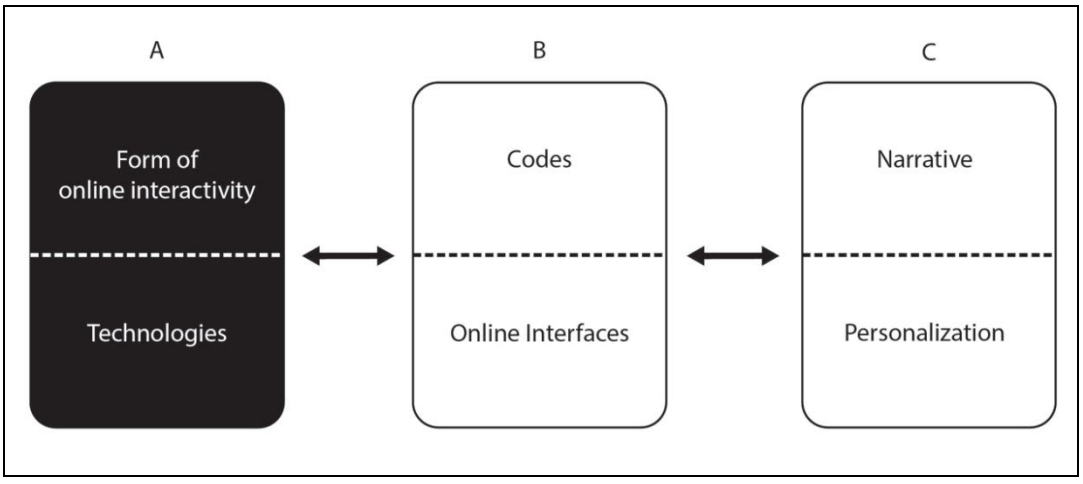

Figure 16. Compound Meaning of Digital Technologies for Forms of Online Interactivity

Collaborations

In regard to the production process, Kwastek (2013) argues that the artist "conceives and facilitates" interactions by incorporating various skills and techniques before interactions take place (p. 92). As a result, the artist works with numerous software engineers to realize interactions by developing and modifying computer programs (Greene, 2004; Manovich, 2001). Kwastek's observation of the artist's artistic processes, which often involve interdisciplinary collaborations, is validated by the interviews with the artists in this study.

However, although the artists collaborate with other professions, the artists stress their authority in the decision-making process. While I largely found this to be the case, the engineers also brought their own unique sets of knowledge and skills to the project. Hershman Leeson, for example, worked online with eighteen programmers around the world, none of whom she had ever met. Together, they developed a new program from scratch called Artificial Intelligence Markup Language (AIML) to power her first artificial intelligent chat bot, *Agent Ruby*. To this day, Hershman Leeson continues to develop updated versions of the program with these engineers.

Neddam has also worked with computer engineers, and seeks advice for her projects online. For example, her early experience of browser technologies involved sharing and exchanging technical knowledge with other online users, such as the prominent Internet art collective Jodi. Since she was not good at using software and code, Neddam would seek help in finding technical solutions by contacting people online via online interactive text-oriented communication systems, for example Moo and Telnet. Neddam's experience as an American scholar Krzysztof Ziarek (2004) describes art-making in the Internet age. He writes:

> New e-based artistic communities and aesthetic orientations are already a reality-or should one say, a virtuality? New Web pages and centers interlinking cooperating artists and related aesthetic developments are easily found on the Internet, even if they may need to be updated rather frequently. (pp. 189-190)

The Evolution of the Web

The complexity of the solutions to the artists' projects explored in this study mirrors the evolution of browsers and the Web. For example, Hershman Leeson, in the late 1990s, foresaw the potentiality of web technologies and wanted to use artificial intelligence to create an interactive online work. Her first idea was to create an avatar named Ruby, who could have an online conversation with a person from the real world through a textual interface accessed via a browser. In order to develop Ruby's conversational ability to the point where it would appear as if users were speaking with a "real" human being online, she had to look for computing programmers around the world to help her solve technical problems.

In the mid-1990s, Neddam showed her interest in incorporating the first generation browser Netscape and later Editor into an artistic project. Neddam illustrated by writing code for building *Mouchette*'s website, on which the user interacts with special features, such as clicking on parts of the site in order to read the artist's narrative and write to the cyber character Mouchette.

In addition, it is important to see how the evolution of digital technology changes the artists' production processes and approaches (Budge, 2013; Greene, 2004). The socio-political facts of the early days of the Internet challenged the artists' creation of online interactivity. Software and hardware were expensive enough to prevent them from being easily accessible to the general public (Manovich, 2001). Moreover, some special technologies could not be available for the public because they were under military control for national security, for example the early use of satellite imagery in the U.S. (Bolter & Grusin, 1999; Manovich, 2001). Throughout the development of digital technology, tech giants have created applications and programs that provide the artists an easier path to realize their artistic vision by modifying these existing programs, in particular open-source software.

A great example is Lozano-Hemmer's various versions of *Vectorial Elevation*, developed from the late 1990s to 2010. The production process of *Vectorial Elevation*, according to the artist's description, shows that the limitations of online mapping technologies and technical challenges of creating new software for locating and mapping, especially before the advent of Google Earth and Google Maps. Lozano-Hemmer emphatically claims that he developed the first program to involve real-time online 3D-simulation in a browser to make the first version of *Vectorial Elevation* in Mexico City's Zócalo Square. He recalled that at this time, high-resolution aerial imagery had not yet been released to the public but was still controlled by the US military. Accordingly, the artist integrated Java, which was a new code at the time, and GPS technologies to develop a program in which, "a fully rendered, 3D virtual world could appear in a browser window." All these efforts were made to provide the user with the ability to design and control light. Some years later, Google Earth, which was released in 2001, surpassed his invented mapping technology in locating the site of the light installation, and Lozano-Hemmer began using these open source applications.

The Reciprocal Relationship

The interview data reveals another relationship between required technologies and forms of online interactivity can be demonstrated in the reciprocal relationship between code and interfaces. First of all, as many agree in the field of digital technology, code is essential to digital presentation. This study does not focus on the aesthetic result of the user's interactions in a work of web-based art. Rather, the interviews demonstrate that the artists all consider programming code as essential to building different forms of online interactivity based on their artistic processes. Hershman Leeson uses a poetic metaphor to describe code as "a spine" supporting her chat bot works. Neddam considers code-as-narrative as a variation of language to power interactions of sharing in her work. Lozano-

Hemmer states that creation of online interactivity is very much determined by programming.

According to the artists, code is essential to the creation of online interactivity. In order to understand this complex relationship, my first step is to define the term "online interfaces" in the artistic process of online interactivity. According to the artists, online interfaces are considered ~~as~~ any computing devices with web browsers connected to the Internet, such as tablets, desktop computers, and smart phones**.** For example, on the one hand, web browsers in the artists' works are frames showing real-time textual conversations in Hershman Leeson's *Agent Ruby.* On the other, browsers are frame for displaying texts, graphic elements, photographs, videos, and music in Lozano-Hemmer's *Vectorial Elevation* and Neddam's *Mouchette*.

Interface for engagement and communication. Unlike a fixed form of traditional art, the relationship between code and forms of online interactivity continues expanding, changing, and evolving through interfaces. Each browser is usually varied from one another and provides the user different aesthetic experiences. As a result, according to Kwastek (2013), "Internet art often self-referentially [explores] its media-based context" (p. 145). As an online user performs interactions, the collection of the user's feedback modifies the work through a process of programmed analysis algorithms (Bolter & Grusin, 1999; Kwastek, 2013; Manovich, 2001).

A great example is found in Hershman Leeson's online chat bots that use artificial intelligence to create ongoing conversations with users. The content of these conversations expands the bots' existing lexicons. In *Weibel-/Manning-Bot*, the bot Weibel's lexicon was originally derived from the blog of Peter Weibel, the director of ZKM. The two bots, Weibel and Manning, learn and collect the meaning of new vocabulary by chatting with real humans. As a result, the expanded lexicon develops the chat bots' communication skills and their linguistic knowledge, which constantly multiplies the content of the work. Hershman Leeson's artificial intelligent bots indeed

evolve when a human says anything to them. At the same time, the user also develops the content of the dialogue in a conversational window. Over the course of a conversation, both bots and humans produce meanings in different aspects; however, their interactions build the content of the work.

Customized interaction. This dynamic relationship between code and individual interfaces together allow the artist to build an online platform in which each user can create their own individual interpretations of meanings, which I termed "personalized narratives." For example, Neddam's early web-based work *Mouchette* develops storylines in different individual browsers without following a non-linear fictional development. Each browser guides the user to freely navigate a web page depending on the user's selection of various options, such as triggering an action directed by texts, images and icons. Later, based on their interpretations of *Mouchette*, this personalized narrative even can even be created by appropriating *Mouchette's* visual elements to create a new form.

In another example, Hershman Leeson's chat bot dialogue window changes to the next when the user's question for the bot changes. The user can ask any questions, stop, and end the conversation anytime they want. Online interactivity creates personalized narration which allows the subject of work "to be appreciated individually" based on a modernist context (Bolter & Grusin, 1999, p. 235). Bolter and Grusin argue that this phenomenon of individual appreciation builds a "reflective" relationship between the user and online interactivity.

Over the course of the user's interactive navigations for individual appreciation, the meaning is produced by the user roaming from browsers to browsers either on a public or personal computing devices (Manovich 2001). All these experiences of interactive art, in fact, "are shaped by individual interpretations and attributions of meaning" (Kwastek, 2013, p. 134). Kwastek believes that interfaces not only function only as a medium of configurations but also play an important role of "bearers of meaning" (p. 144). This

concept of generating meanings throughout the interaction process reflects an important fact of the relationship between content and form in media art that the work of content and interfaces "merge into one entity" (Manovich, 2001, p. 67).

The Influence of Twentieth Century Artistic and Cultural Contexts

In the 1990s, the use of Internet technologies began to challenge the usual ways of displaying and interacting with art. Interactive web-based art moved away from the traditional media status quo of physical production, exhibition, and sales. This section discusses the influence of historical and cultural contexts on the artists' practice of online interactivity. This is the only thematic category in my findings discussed in Chapter V that does not combine with other thematic categories. Even if the participating digital media artists initial training may not have been deeply steeped in fine arts, their responses to this thematic category reveal that they, nevertheless, each look back to earlier art movements in order to expand the possibilities of their online interactive art projects. Additionally, the artists also emphasize the importance of art history in their pedagogies, in particular from the students' perspective.

Although my original research question focused on specific ideas in the history of art which have influenced the artists' practices of online interactivity, the artists also cite some examples of social liberalism in the twentieth century as significant elements of their creativity. Historical ideas not only help the artists build a conceptual framework but also create the form of online interactivity.

Twentieth Century Art History

The primary concepts in twentieth century art which have influenced the artists' practices include Cubism, Dada, Fluxus, happenings, and conceptual art (Green, 2004; Morse, 2003; Ziarek, 2004). Lozano-Hemmer, for example, considers happenings to be

very “useful in the digital world.” By using the happening approach to create online art, the artist creates a situation in which the user’s interactions produce contents of the work and further finalize the form of the artwork. Similarly, Neddam explains that interactivity derives from conceptual art which originally stemmed from French pioneer Marcel Duchamp’s readymades. She often says that conceptual art significantly influences her practice. Particularly, artists like Lawrence Weiner and the Art and Language collective, who use language to create art, relate strongly to Neddam’s training in literature. The artists’ creation of online interactivity has its roots in the tradition of happenings and conceptual art in the 1960s, which emphasized interdisciplinary artistic processes, participatory activities, and autonomous improvisation (Green, 2004; Morse, 2003).

Marcel Duchamp. Among avant-garde artists, Duchamp’s ideas continue to most influence and inspire the artists’ creation of online interactivity, especially his ideas of readymades and the active viewer who creates a painting. Hershman Leeson also cites Duchamp as an influence on her web-based art projects, but does not go into as much detail as Lozano-Hemmer and Neddam, both of whom detail how Duchamp’s ideas have guided them, throughout their practices of online interactivity.

Media art literature often details and discusses Duchamp’s pioneering ideas in the history of art in examining the origin of interactivity (Green 2004; Lovejoy, 2004; Kwastek, 2003). Green examines Duchamp’s random expression and readymades which relate to instructional features in Internet art. Similarly, Kwastek argues that Duchamp “used random processes to challenge artistic composition by replacing it with non-intentional events” (p. 11). According to Kwastek, interactive art evolves from Duchamp’s dispute of the artist’s intentionality. Unlike these media art theories, the artists examined in this study often relate Duchamp’s ideas of the active viewer and readymades to how they create online interactivity in the art-making process.

The active viewer. All three artists subscribe to some variation of Duchamp’s (1957) aesthetics of the role of the viewer in the creative act, which disputes that artistic

intentionality should be based on the tradition of object-oriented ontology. The Duchampian viewer is an active creator of a painting, rather than a passive recipient of pictorial narratives. By developing the concept of the active viewer, the artists create a "condition" to use Lozano-Hemmer's word, or a "situation" to use Neddam's, where the active user produces an individual experience of perceiving the work. As such, Lozano-Hemmer believes that the user finalizes the work, and Neddam expresses the belief that the user continues expanding a dialogue which originally came from her own work.

Kwastek (2004) uses Duchamp's work *Bicycle Wheel* (1913) and *Roto-Reliefs* (1935) to argue that the role of the view changes in interactive art. Although Kwastek's examination of the origin of interactivity and interactions provide an overview of a historical evolution in detail through the history of modern and avant-garde art, this study seeks to understand the historical context in relation to the artists' 'creative act,' to quote Duchamp. The artists' understanding of the viewer as a creator of the work echoes Duchamp's (1957) account of this viewing relationship between the artist, the work, and the spectator. Duchamp states:

> All in all, the creative act is not performed by the artist alone; the spectator brings the work in contact with the external world by deciphering and interpreting its inner qualifications and thus adds his contribution to the creative act. This becomes even more obvious when posterity gives a final verdict and sometimes rehabilitates forgotten artists.

Duchamp's account above clearly explains the connection between the artists' creations of online interactivity and the particular historical context of the active viewer.

Readymades. Another important Duchamp concept, that of readymades, often was stressed throughout the interviews. According to the artists interviewed in this study, the appropriation of readymades for creating their online interactivity allows the user to create contexts in a work of art. From this view, Readymades in Neddam's practice represent the artist's action which "[changes] the way the viewer envisions or receives a

work". Redaymades allow her to "find the situation, create the situation where art happens."

Likewise, in Lozano-Hemmer's view, "artists don't generate objects, artists generate contexts". In addition, he relates instructional means of readymades to his practice by explaining Duchamp's readymade work *Fountain* (1917). Lozano-Hemmer elucidates:

> Everybody, for example, today is comfortable with an artwork that is an instruction. This would not have happened or at least, maybe it would have happened, but not as quickly as Duchamp did. What Duchamp did is, he said "Okay, well look the artwork is me deciding that this urinal is an artwork." That's an instruction. That's something that he did, which completely removes the artist from the tactile, from the traditions of art-making that, were up to that point, existing. Today as we have digital artworks, we understand that we also are instruction-based.

Lozano-Hemmer's description gives us a close look at the artist's thinking about developing the original avant-garde concept of readymades to create online interactivity. Lozano-Hemmer connects the instructional feature in Internet art to Duchamp's readymades, unlike many media-art theorists. For example, Internet art historian Greene (2004) finds the influence of Dada, Fluxus, happenings, and video art forms on the operational and technical viewpoints of the computing settings which allow the viewer to experience the art. Greene argues that Dada's artistic expression of randomness is supported by "instructions and chance words variations," in particular poetry creation (p. 20). Additionally, Greene relates the instructional nature of Internet art to the tradition of Fluxus and happenings "which relied on scores or instructions, have been recognized as historical precursors to new media-based forms of generative art" (p. 152). Similarly, Kwastek (2003) notes that the participants were provided with viewing instructions in Allan Kaprow's *18 Happenings in 6 Parts* (1959).

Cultural-Socio and Political Movements

Besides the history of art, the artists also cite significant twentieth-century cultural and civil rights movements as inspirations. Hershman Leeson, for example, mentions the Free Speech Movement at Berkeley from 1964 to 1965. Similarly, Lozano-Hemmer talks about the Stridentism movement in Mexico City from 1921 to 1932. Stridentism was a political avant-garde movement and inspired him to integrate web technology into his interactive digital art installation in public space. In addition, Neddam has received many inspirations from avant-garde literature movements including the French group Oulipo and British philosopher J. L. Austin's theory of speech acts, which became a foundation for computer actions. The theory of speech acts, as Neddam notes, is an advanced model of computer language in a pre-digital time.

These liberal ideas in the twentieth century, according to my observations, deeply inspired the artists as they built their conceptual frameworks and affected their style/mode of online interactivity**.** Lozano-Hemmer does not aim to make a new form of art in history, but merely hopes to help the viewer reflect critically on our wired society. In the interview, he calls his creative act an activist's intervention in society. As Kwastek (2003) suggests, a close relationship between interactive media art and cultural reflections in media art can be examined through a lens of the power of media art over society. She notes that media art's chief mission is to exercise "a creative influence on the information society" by employing two ways which "range from communication platforms for grassroots democracy created in the early years of Internet art to the possibility of expressing opinions in public" (p. 41).

In addition, Morse's (2003) argument may also explain the effect of these cultural movements in the late 1960s and the 1970s on the form of interactivity. Morse suggests that before examining an element of artistic interactivity, one should first consider these cultural movements. According to Morse, liberal thought inspired the artist to pioneer movements of participatory aesthetics by allowing the viewer to co-create "conceptual,

pop, performance, body, and video art." (p. 17). Morse states that the artist allows their own authorship to be absent, and the viewer is invited to participate in a work. Both Kwastek and Morse's observations provide an understanding of the link between civil and liberal movements and the artistic practice of digital interactivity.

Reflection in Teaching

This section explores the reciprocal relationship between the artists' professional practice and teaching experience. Although I have already discussed this concept of reflection-in-action at length in Chapter II, in this section, I appropriate the concept of reflection-in-action to demonstrate the means by which artists transform their experiences of online interactivity into pedagogies. Based on my findings, I would like to further integrate the meanings of the artists' pedagogical concepts and practices of online interactivity with a discussion on the role of the artist in the teaching process.

The title of this section utilizes Donald Schön's (1983) constructivist concept of *reflection-in-action,* which suggests that a professional practitioner "can think about doing something while doing it" (p. 54). The concept of reflection-in-action is a fundamental theory in modern discourse about professional performance, which treats "artistry in situations of uniqueness and uncertainty" (p. 165). As Schön notes, in the process of reflection-in-action, a practitioner applies his or her past experiences to understand and deal with a series of unknown situations.

This process of problem solving in studio art teaching and learning is comprised of unique and uncertain situations, including the students' development of conceptual frameworks, technical issues, practical matters, as well as their mindsets and emotions. Although the artists grant that their artistic processes are similar and even the same as art students', the artists' role in the teaching-learning process functions more like a facilitator

and a mentor, who helps the students recognize problems and experiment with solutions for realizing the students' projects.

Shared Experience in the Problem-Solving Process

The participating artists assume that the students' artistic processes will be similar to their own, full of trial-and-error. According to British visual art researcher Ian Heywood's (2009) study on studio teaching and learning, an art student in a teaching studio "is meant to learn both to make art and what it is to be an artist" (p. 196). Heywood's observation shows that the artistic processes of the teacher and student are actually quite similar. The artists' studio teaching involves sharing their own experiences of realizing projects, as the interview data show.

The problem-solving process. Many scholars in art education fields argue that problem solving is essential to the artistic process (Harwood, 2007; Schön 1983, Walker, 2004). As a result, guiding students' art projects "begins with an effort to solve a problem as initially set" (Schön, 1983, p. 268). Based on the essential nature of problem-solving, the general patterns of the artistic process show that the creator of the work deals with technical issues as well as constructing conceptual frameworks around theories (Harwood, 2007; Heywood, 2009; Schön 1983, Walker, 2004).

Heywood's (2009) account of studio teaching objectives explains challenges in the art-making process. Heywood believes that studio art education focuses on a process of making, which involves technical learning, relevant historical and theoretical awareness, intrinsic uncertainty, and judgment exercises. Heywood's argument is parallel to the artists' accounts of the primary challenges in art students' working processes including techniques, financial realities, conceptual frameworks, and mindsets.

These challenges in the process of experiments are also described by Duchamp's (1957) concept "the creative act." As Duchamp says:

> In the creative act, the artist goes from intention to realization through a chain of totally subjective reactions. His struggle toward the realization is a series of efforts, pains, satisfaction, refusals, decisions, which also cannot and must not be fully self-conscious, at least on the esthetic plane.

Duchamp's statement above reflects the artists' descriptions of their own and the students' artistic processes in this study.

Practical matters. In the interviews, the three artists often refer to practical issues in the students' working process, including technical and financial matters. As might be expected, given their diverse practices and training backgrounds, the three participating artists employ different approaches in facilitating their students in practical matters. For example, Hershman Leeson and Neddam often collaborate with programmers to realize their projects. In their teaching, they usually encourage the students to explore and experiment with various solutions for the appropriate technologies without providing the students specific software and related technical instructions.

The scientifically trained Lozano-Hemmer likes to share his own experience with an emphasis on the technical process alongside the financial aspects of art-making. In the interview, his conception of the most important aspects of teaching consists of "management, organization, preservation, and team building." Lozano-Hemmer's pedagogy is obviously inspired by his experience before he became a major artistic figure. As a young artist in the 1990s, information about how to create digital art was very limited, and as a result, he had hoped that someone would share their knowledge of creating digital art with him.

Indeed, Lozano-Hemmer's pedagogical concepts, which emphasize technical and financial matters, derive from his core value of being an autonomous artist. It is important for an artist to maintain his or her independence and autonomy in order to create freely. However, as Lozano-Hemmer observes, conversations about money are rarely discussed in the art world. In the real word, Lozano-Hemmer maintains a studio team to realize his projects and then preserve digital works at a cost to institutions and collectors. Most

important of all, he strongly believes that his creative independence is essential to both his own and the young students' practices.

Art history. When it comes to helping students conceptually develop a work, the artists' thinking in the interview reveals the significance of being knowledgeable about the history of art. In other words, the artists encourage the students to build a conceptual framework for the art project by exploring art historical ideas, in particular those of pioneers in the history of art. Building a conceptual framework in the artistic process refers to creating "big ideas in the art-making process" (Walker, 2004). American art education researcher Sydney Walker explains, "Big ideas can be characterized as themes, issues, or perhaps questions that captivate the artist for extended time periods, often for years" (p. 7).

In order to avoid the conceit of thinking that they are producing completely original work, the artists all suggest that art students study what has been done in the past. Lozano-Hemmer, for example, not only develops his own projects by exploring and developing pre-existing ideas, but also strongly encourages his students to master the history of art to help them form a conceptual framework for their projects. Similarly, Hershman Leeson does not stress the importance of studying art history, but advises her students to create something innovative.

The act of searching for existing historical ideas in the artistic process is similar to Schön's (1983) descriptions of a designer's experimental process through drawing, which requires the designer to "learn the traditions of graphic media, languages and notations" (p. 158). In his discussion of the artists' emphasis on understanding and knowing historical events in the artistic process, Walker's (2004) study on a ten-week art education studio course at Ohio State University may suggest this approach of studying existing artistic events and ideas from the students' perspective. Walker observes that the students seek precedents to their big ideas. Walker writes, "The undergraduate and graduate students initially investigated the art-making process in the practices of professional

contemporary artists as revealed in artist interviews (published and video-recorded), artworks, and critical writings seeking evidence of the artists' process in creating artworks" (p. 8). Additionally, according to Heywood (2009), one of the purposes for studio teaching and learning is "finding some affinity with one or other approach to practice, and displaying relevant historical, theoretical and technical awareness" (p. 197). Heywood also believes that examples of historical and contemporary practices stimulate the student's creation.

The artists often relate the development of their projects to the exploration of precedents' ideas in technology, culture, and art. Indeed, historical ideas and events inspire the artists' artistic approaches. The artists believe that studying relevant historical events, theoretical events, and concepts is vital and significant to the students' artistic processes.

Growth mindsets. The artists interviewed in this study emphasize that imparting a positive mindset to their students is just as important to the artistic process as developing technical skills or developing a specific conceptual framework. This positive attitude is especially important when dealing with the frustrations and financial difficulties of the art world. This is in contrast to Schön's (1983) theory of reflection-in-action, which emphasizes the mechanical, operational, and instructional viewpoints in the process of imparting professional knowledge. The artists' descriptions of their teaching experiences reveal two patterns of building the students' mindsets. One is emotional support when the students feel frustrated in their artistic processes. The other is to encourage the students to be open-minded.

First, in this study, the artists provide emotional support when their students experience frustrations in the artistic process of conceiving and developing projects. For example, Hershman Leeson supports her students by making them "interested in the magic of creativity." Moreover, Hershman Leeson encourages her students to believe in themselves while her students express fears of "not making money" in their art careers. In

addition, Neddam shared a story about her student's final digital art project, which received terrible reviews from other faculty members, who still understood digital art as a "gadget" rather than real art. Neddam gave the student a positive response, and said, "you shouldn't be influenced. It was interesting seeing what you were doing and you should continue."

Second, all three artists' interview responses show their emphasis on the importance of being open-minded in the artistic process. When asked about the perspective she hopes to instill in her students, Hershman Leeson suggested that art students "keep changing things with the times [and] invent technology." Hershman Leeson's advice shows an open-minded strategy for innovation, when creating online interactivity allows one to create a new project without compromising one's original idea or thought. In the same way, Lozano-Hemmer comments on the effect of rapidly changing developments in digital technology on artistic creation. He says, "[Keep] an open mind that ultimately what we see as online interactivity today is certainly going to be so different from what we will see in ten years just by seeing what has happened in ten years." Accordingly, Lozano-Hemmer transforms this observation into his pedagogy. Lozano-Hemmer believes to "teach a certain kind of humility— that we don't know, and that we need to be open to where it might go."

Along the same lines, Neddam articulates the idea of keeping an open mind in another way: she trains art students to perceive a work of art, rather than to make an art object. That is, she believes that an artist creates a good conversation by being a listener and receiver, which makes the work "be open to transformation and improvement." She says, "That part of having your work of art transformed and improved by someone else is the sign that you understand what art is."

Although Schön's (1983) theory of reflection-in-action focuses on the process of imparting professional knowledge, his concept of "situation's back-talk" in a process of design may provide a relevant reasoning for having an open mind. According to Schön,

the act of back-talk is a reflexive conversation with uncertain situations in the process of knowing and making. The act of the situation's back-talk "takes the form of unanticipated meanings, problems, and dilemmas" (p. 347). During reflection-in-action, the creator's back-talk with the situation happens along with "the construction of the problem, the strategies of action, or the model of the phenomena, which have been implicit in his moves" (Schön, p. 79). Schön argues that the practitioner must be open to the situation without a particular stance in the process of reflection-in-action.

The artist's past experience. The artists described significant inputs of their past experiences of conceiving and creating online interactivity to advise the students' artistic processes. The artists' experiences of online interactivity provide a complete blueprint for their teaching concepts and instructional strategies (see Figure 17). Neddam, for example, uses two opposing methods to translate her practice of online art into pedagogy. First, she keeps her own practice very separate from the class, which originates from her choice to remain anonymous in most of her Internet art projects (for example *Mouchette* in the late 1990s). In addition, institutional realities affect her decisions of how to incorporate her artistic experience into teaching content. Some institutions hold a traditional stance of defining art and do not recognize Internet art as a type of art in traditional categories, while other institutions invite her to teach seminars based on her practice of online interactivity. From 2005-2006 and in 2008, Neddam taught summer courses on virtual characters at the University of Quebec in Montreal (UQAM) in Visual and Media Arts. Neddam recalls, "I was invited to do a master course and then I used that as a seminar in the master course for 6 months. Here, I was really invited as the artist who I was, and I could use also my teaching practice to really have a much more open view on what the student in this master's program would produce. They would also produce them from within that practice."

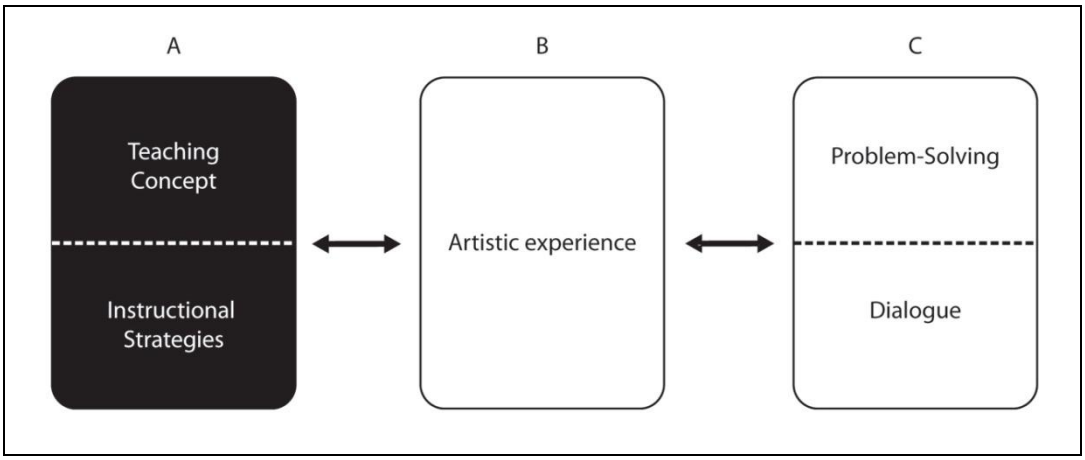

Figure 17. Compound Meaning of the Artists' Artistic Practices of Online Interactivity and Their Studio Teaching

Note: Column B "artistic experience" in this diagram refers to the artists' experiences of online interactivity which provide a complete blueprint for their teaching concepts and instructional strategies. Based on the findings, the artists' experiences of online interactivity have two key components: Problem-solving and dialogues.

In another example, Lozano-Hemmer often expresses that his pedagogy emphasizes sharing his experience with his students, sharing especially the challenges he has encountered in past projects. He likes to share these stories of failure, and the students enjoy hearing about his previous mistakes. For example, in his very early work called *Re:Positioning Fear* in 1997, Lozano-Hemmer describes his experience of failure:

> That piece was a discussion. It was an IRC, like an Internet Relay Chat discussion about the concept of fear, which was projected on an arsenal, a military arsenal in the city of Graz, Austria. When I made this project all the online texts were being projected inside the shadows of passersby. I wanted to use the shadow as an example of a very sort of German Expressionist style, you know, kind of fear, and monstrous. I was trying to create this very stark contrast for people to have this relationship. In fact, as soon as the project started within seconds people started being playful, and having fun, and reacting to each other with their shadows. Nobody ever thought about anything to do with fear. It was very funny, and a big failure, but on the other hand it was exciting because all the shadows I made after that were all playful, and I learned something from that experience.

Hershman Leeson also sees similarities between her own artistic process and that of her students, especially when thinking about the contribution of her experience of online interactive art to teaching. She says, "[The artistic process] is the same thing, [creating] a flowchart, set of problems, then [solving] them together." Both Hershman Leeson and Lozano-Hemmer's responses indicate an important pattern of their artistic processes and their students' artistic processes, which are not only a form of creativity, but also a form of problem solving.

Reflective conversation. In order to share experiences, the artists' primary instructional approach is building a dialogic relationship. The artists all naturally claim that their teaching includes sharing thoughts through conversation among the instructor, art students, and peers. The artists often facilitate students' individual projects through guiding conversational interactions. The artists all believe that creating and guiding dialogues is a central tool in helping each student solve problems on an individual basis. For example, Lozano-Hemmer believes that the seminar is a more effective approach than lecturing. His rationale for conversational approaches in teaching is that lecturing about a sophisticated artistic idea is truly difficult, but it is much easier to have conversations with art students. Hershman Leeson's instructional strategy primarily addresses the performance of a continuing dialogue.

Additionally, Neddam sees dialogue as essential in her teaching, which mirrors her artistic practice of online interactivity. The exchange of dialogue contains a specific pedagogical purpose in Neddam's teaching. She considers dialogues as a form of critique. Not only does the professor critique the students, but the students also critique one another. Moreover, Neddam sees peer discussions as very important to training art students how to send, receive, and listen to critique of a work.

Schön's (1983) concept of reflective conversation provides a better understanding of this process of dialogue in the artists' instructional approach. Each student's artistic process is a unique and uncertain problematic situation, according to Schön's argument of

reflection-in-action. In the process of conversation, the teacher performs reflective conversation and functions as an agent between their own and the student's artistic processes. Reflective conversation, according to Schön, allows the artist to first sense and identify problems based on their own professional experience rather than on a theoretical basis. In the midst of conversation, the artists may "surface and criticize [their] initial understanding of the phenomenon, construct a new description of it, and test the new description by an on-the-spot experiment" (p. 63).

The artists' strategies for conducting dialogue demonstrate Schön's (1983) description of the interactive process of reflective conversation. For example, in conversing with a student, Lozano-Hemmer first seeks to understand the student's problems. Then, he shares a relevant experience in order to suggest a possible solution. Lozano-Hemmer, as a teacher, also benefits from reflective conversation. He says, "I also learned what they are using, and how they are approaching a problem. It's a nice two-way experience."

I conclude this chapter by expanding on the role of the artists as a facilitator and a mentor in the teaching process into an inquirer. According to Schön's (1983) concept "the process of inquiry," he suggests that in processes of inquiry, a practitioner integrates his or her past experience and generally goes through the following stages: listening to the situation, identifying problems, describing facts and problems, and building solutions and strategies.

The patterns of the artists' reflection-in-teaching found in this study acknowledge "the process of inquiry." The interview data show that the artist begins as an inquirer looking for information about challenges and difficulties through dialogue over the course of the student's artistic process. Later, the artists advise the students on how to construct a repertoire of techniques and concepts by integrating "the whole of his or her experience insofar as it is accessible to him or her for understanding and action" (Schön, 1983, p. 138). As Lozano-Hemmer expresses in his pedagogical concept and strategies,

“In teaching, what I try to do as much as possible is just to share the ways in which we have succeeded making complex works that without compromising some of the ideas, and the impact of the work.”

When teaching, the artist functions as an inquirer, facilitator, and a mentor. The educational goal of studio courses is to use making and knowing to help an art student become an artist (Heywood, 2009). With their rich experience of online interactivity, the participating artists in this study recognize the students’ problems and then encourage the students to imagine, experiment, and create innovative technological solutions for their creative acts.

Chapter VII

CONCLUSION

This study began with the question: How can interactivity be taught, in particular online interactivity? Additionally, how is teaching online interactivity different from teaching traditional media? These questions originated from my teaching and artistic experience. Some media art literature distinguishes between traditional and digital media, for example Lev Manovich's (2001) view of operations. Manovich argues that media art requires an algorithmic process and traditional art often involves hands-on approaches. Manovich's discussion on the operational process of art-making, in fact, recalls my teaching experience in the Fine Arts Department, National Taiwan University of Arts. In Chapter I, I recalled that many of my students showed great interest in using digital technologies to create interactive projects, while their required courses were predominantly in oil painting, drawing, and other traditional media, while very few elective courses covered technology-related theories and studio practices. Although I did not teach studio courses in traditional media, the art students who took my other courses (e.g., Curatorial Practices, Mixed Media, and the Guest Lecture Series) would have conversation with me on their digital art projects outside the class. For example, a student invited me to see his semester project. The student created an interactive video installation which incorporated video games and projected the game on a big screen. The student asked me about technical issues and art historical examples. This institutional context, and my students' curiosity about using digital technology to create interactive

work, led me to reflect on studio pedagogy of digital creation: How did I support my art students' artistic processes around digital interactivity? What professional knowledge of technology and theories did my students need to acquire in order to conceive of and develop projects around digital interactivity? With these questions in mind, I decided to seek answers from experienced artists' own descriptions of their artistic processes in digital interactivity, in particular web-based art.

In order to probe into this study's research theme through the artists' own voices, I employed an in-depth interview method in order to better understand possible practices and conditions for creating online interactivity. Indeed, the artists' responses illuminate the primary research themes of this study: specifically the role of online interactivity in the artistic process as well as the artists' practices of online interactivity in their approach to teaching.

This particular focus on the creator's artistic processes allowed me to fully examine the creation of interactivity itself and furthermore its connection to pedagogies of studio art. As such, this study excluded subjects of viewers and art students for the following two reasons: Exploring the physical presence of interactive installations usually raises more objecthood-related content in visual art studies. The viewer's interactive experience involves complex individual factors, such as personal experience, cultural value, psychological processes, and aesthetic issues.

Most of the art education literature presented in Chapter II examines the learning and teaching of digital technology in higher art education through a lens of computing facility and support for implementation in the teaching-learning process. To recall just one example, American art educator Nancy Macko (1997) believes that teaching is closely related to multimedia. She notes, "Students will be using multimedia for their projects. We will all be designing and writing multimedia presentations" (p. 205). Her study examines the reality of the incorporation of technology-based activities and projects into teaching and learning in the advent of computer and the Web. She argues

that the relationship between art and technology shapes existing curricular based on traditional media and is affected by practical matters such as skills and high cost.

In this closing chapter, I do not aim to precisely answer and define these inquires. Instead, I would like to puzzle over the pieces collected from the artist interviews to possibly elaborate on "the ever-changing situation" in both their artistic process and studio teaching of online interactivity, and what that might mean for other artists and teachers.

This chapter is composed of three sections: Section One summarizes the findings concerning the core research questions, including the artistic processes of online interactivity and their pedagogy. Section Two focuses on educational implications, suggesting possible directions for pedagogy in studio-based courses of interactivity in higher art education. Section Three suggests future inquires for researchers and scholars working in related fields.

Responses to the Research Questions

The Artistic Process of Online Interactivity

The central research question of this study is: How do the three selected digital media artists conceive of online interactivity, and what role does online interactivity play in their artistic processes? I further divided this research question into sub-questions in order to more deeply explore the artists' artistic processes of online interactivity. These sub-questions included: (1) What artistic strategies do the three selected digital media pioneers incorporate into their ongoing artistic processes of interactive web-based art? (2) What forms of online interactivity might be specific to the three selected digital media artists' practices? (3) How do specific artistic techniques, and technologies, skills inform online interactivity in the artistic process? and (4) How do the three selected digital media artists' situate their interactive web-based work in historical contexts of art?

During the process of data analysis, emerging patterns around each sub-research question in fact interconnected to each other. As such, this study was able to draw a global picture of the three selected artists' artistic processes of online interactivity. Situating this in relationship to the literature review examined in Chapter II, I distill complex concepts presented in Chapters V and VI into two themes suggested to be central in the artists' thinking: *the dialogic relationship* and *technological development.*

The dialogic relationship. The nature of online engagement is interactive, as explained at length in Chapter II, and as Krzysztof Ziarek (2004) states. He illustrates this through the example of e-commerce in the Internet age:

> The fact that I can so easily buy books and CDs from Germany, France, or England-from anyone who has established a presence on the World Wide Web-constitutes, for myself at least, the most immediate testimony to the changing speed and mode of interaction in today's world. (p. 189)

This interactive nature of web usage directed one of my many interview questions: if the Internet in itself is interactive, what does interactivity look like when it comes to creating web-based art? In answering this question, the participating artists, Lynn Hershman Leeson, Rafael Lozano-Hemmer, and Martine Neddam all considered creating online interactivity as building a dialogic relationship between the users. The artists create "a situation," to use Neddam's phrase, or "a platform" to quote Lozano-Hemmer, rather than an object of art. As such, the viewer of traditional art is transformed into a user and agent who develops and contextualizes the content of the work in the process of interaction. According to Neddam, the user is a sender and recipient.

Additionally, building this dialogic relationship does not involve only direct aesthetic experience but also a critical thinking about art history, technology, culture, politics and other global issues. According to the artists' responses, one of the purposes of conceiving and creating online interactivity is to evoke the public awareness of censorship and surveillance in the society (Chapters V and VI). More broadly, media art

literature often associates the user's interactions with socio-cultural participation (Green 2004; Kluszczyński, 2010; Kwastek, 2013).

Technological development. The shifting use of technologies to create online interactivity in different stages of each of the artists' careers echoes the evolution of digital technology. The use of technology depends on the availability of the resources at the time, without, however, being a hard limit. If technology cannot meet the artists' artistic needs, the artists develop new programs for realizing their concepts.

As the artists suggested, using technologies is like tactile painting and sculptural media. Neddam expressed the idea that using traditional and digital media is the same thing. She feels that using computer programs to create online interactivity is like using paints and clay to create a traditional work of art. Moreover, her web-based creation stems from the legacy of avant-garde movements. Lozano-Hemmer says that the use of digital or web technology is his artistic language and that online interactivity becomes common in everyday life. People naturally learn this "language" in today's digital world.

Pedagogies of Online Interactivity

The research question concerns the relationship between the artists' practice of online interactivity and their studio pedagogies: How do the three artists' practices of online interactivity influence their studio art teaching in higher art education? The sub-research question evolved and developed to include: (1) How are changes in the three selected digital media artists' artistic processes of online interactivity taken into consideration in their pedagogies? (2) What instructional strategies do the three selected digital media artists use to recount the relationship between their studio art teaching and artistic experiences of online interactivity?

This study uses Donald Schön's (1983) theory of reflection-in-action as the core theoretical foundation to explore the relationship between the teaching artists'

professional experience of online interactivity and their studio pedagogies. Building on these notions from Chapter V, this study suggests that the artists' artistic processes, their pedagogies, and their students' artistic processes build a dynamic and reciprocal relationship among each other.

The two recurrent patterns in the artists' pedagogies found in this study are: *the process of problem-solving* and *reflective conversation*.

The Process of Problem-Solving

An important idea emerged, which is that the artists consider their own artistic process as the same as their students'. As such, both the artists and the students' artistic processes share a similar path of problem-solving which involves conceptual frameworks, attitudes, technical solutions, and financial plans. As the Canadian education scholar Tara Fenwick (2000) interprets Schön's constructivist theory of adult education, "[the practitioner's] knowledge is constructed through reflection during and after this experimental action on the ill-defined and messy problems of practice" (p. 249). The artists incorporated their own past artistic experiences of failed and successful projects into their teaching to guide the students in developing their own projects. This artists' pedagogical strategy verifies Schön's (1983) theory of reflection-in-action.

In the students' processes of problem-solving, the artists often encourage the students to experiment with a variety of solutions, in particular technical issues concerning digital technology. In addition, an interesting pattern shows that the artists provide emotional support when the students have frustrations and depressions in the art-making process. However, art education literature generally focusses on teaching techniques and learning results and less studies the mentoring of students' artistic processes around the students' mindset. Sydney Walker (2004) argues that, regarding instructing the student's learning, reflective practice in artmaking is a process of meaning making. As such, Walker suggests "instruction intervention" to "[directed] student

reflection upon artistic practices that characterize more inventive and critical artistic activity" (p. 12).

Another emergent theme of the artists' pedagogies is an engagement with financial matters, mentioned in the interviews with Hershman Leeson and Lozano-Hemmer. Financial education is also rarely examined in art education theories, and if mentioned often addresses the cost of access to facilities. For example, British scholar Ian Heywood (2009) argues that although maintaining a studio environment costs an institute a lot of money, a studio is needed for better studio learning. In another example, Macko's (1997) study shows that access to technology costs a lot, and not everyone can afford it.

Teaching through Conversation

The primary instructional approach used in the artists' studio teaching is conversation, which is often referred to, as Neddam also calls it, "critique." Neddam considers her studio teaching as specifically studio critique, rather than teaching how to use a medium. She states that her teaching approach is inspired by her own practice of online interactivity. Hershman Leeson believes her teaching is all about creating a good flow of conversation in the class. Likewise, an aesthetic idea, for Lozano-Hemmer, is very sophisticated, and as a result, is difficult to deliver through lecturing. The artists rely on conversation with the students in order to learn about their problems and provide appropriate guidance.

Conversation is a medium among the teaching artists' ideas, the student's explanation of the work, and peers' feedback (Barrett 1988; Harwood, 2007; Schön, 1983). According to Schön, professional practitioners use their past experience as an input in reframing the conversation in the process he calls "reflective conversation." Schön's concept of reflective conversation can be seen in the artists' illustration of sharing thoughts and experience through conversation in their studio teaching.

Implications of Education

This section suggests potential pedagogies of studio courses on online interactivity in higher art education. As I noted earlier, both the participating artists and their art students' artistic processes deal with various problems and engage creative and technical solutions for realizing projects. These problems cover technological skills, practical matters, and their mindsets. Surprisingly, the findings show that the artists' responses to their pedagogies present a general view of studio art reaching, rather than an emphasis on teaching online interactivity in particular. In regards to their studio teaching related to their artistic experiences of online interactivity, the artists believe that the creation of online interactivity has its roots in critical reflection on digital culture with humanistic views. Drawing from Chapters V and VI, I present the following themes to consider potential pedagogies: *development of mindsets, technical support and financial knowledge,* and *theoretical knowledge.*

Development of Mindsets

It is important for an art educator to encourage and motivate the students' artistic interest in creation, although there may be risks and failures in the process. The artists describe their students as having fears and frustrations during the artistic process of creating a project. Both Hershman Leeson and Neddam had positive conversations with the students, which encouraged the students to push through the difficult times in the process of artmaking. Lozano-Hemmer shares his own experience of failure with the students. However, the student's emotional support is not detailed in Schön's (1983) theory of reflection-in-action, and other art education literature which often emphasizes the student's learning in terms of assessment, skills, techniques, and knowledge (Harwood, 2007). In addition to the required professional knowledge and skills of art-making, developing pedagogies with a focus on building the students' positive mindsets may benefit the students' artistic processes of realizing an art concept.

Technical Support and Financial Knowledge

Making art is a process of problem-solving which often demands appropriate solutions for technical problems, financial matters, and legal issues. Technical problems involve the use of technology for realizing the concept. Current art programs in higher art education often offer a variety of studio/practice based courses in software, separate from more theoretical courses such as art history and art criticism. Studio/practice based courses assist art students in learning required techniques and skills to realize his or her project.

Financial matters are another important factor in the students' working process. Lozano-Hemmer, according to his own experience, stresses the importance of understanding financial matters in order to be an artist who can create art freely. Hershman Leeson talks about the students' fears of not having money to create art. Lozano-Hemmer and Hershman Leeson's responses identify the necessity for addressing financial issues in studio-based learning.

In addition to financial education, the artists' descriptions of their artistic processes inspire this study to add legal issues to the list of practical matters involved. Particularly in the age of digital reproduction, copyright issues are important to understand. For example, when the artists collaborate with programmers, or use images online, copyright issues are critical. The learning and understanding of financial matters and legal issues may help the students professionally and ethically create art as their work enters both the digital domain and the real art world.

Theoretical Knowledge

The artists in this study emphasize the importance of studying art history as well as global viewpoints. Most art schools divide the curriculum into two categories: theoretical and studio-based courses. The core theoretical-based courses are typically art history related topics for specific periods. However, as we see in the interviews, the artists' creation of online interactivity is often inspired by their critical thinking about current

global issues and socio-cultural and political events and movements. This study may suggest the value of expanding from art history courses into other fields such as culture, society, science, education, and politics to foster larger contexts for students' work and exploration.

Further Questions

This section discusses possible future inquires that might emerge from this study. The first part of this section focuses on the artists' artistic processes of online interactivity, and is followed by a focus on pedagogy.

The Artistic Process of Online Interactivity

Collaborations. The artist may collaborate with other professionals to create work, which is not new in the history of art. We can find these examples of collaborations in art movements of Dada, Fluxus, and happenings. In this study, the artists and computing engineers work together to produce online interactivity. For example, Hershman Leeson looked for 18 programmers around the world to create the chatbot character Agent Ruby. Neddam also works with programmers in the process of developing the most recent project *MyDesktopLife*. The artists often take on a role similar to a film director in this process of collaboration for problem-solving (Hershman Leeson, Personal communication, November, 2015). While analyzing the data, the following questions have to be taken into further consideration: What do the artists consider their collaborative experiences of realizing interactive projects? How do they describe their experiences of finding professionals for projects? How do they not comprise the original concept when working with professionals? These and other questions may provide insights into how to facilitate art students who employ a collaborative approach in their artistic processes.

Historical contexts. Some studies of media art literature examine the insertion of avant-garde concepts into web-related artworks by analyzing aesthetic issues of techniques, and the viewer's perspective, but not the artist's intention. For example, German media studies researcher Roberto Simanowski (2011) links the transformation of web texts into art media with modern artistic techniques, such as collage, assemblage, and everyday materials, as well as Dada's literary techniques. From the viewer's experience, Simanowski argues that these art installations created by web texts are works of "experiential and documentary" literature and "real-time and ready-made" sculpture (p. 188).

Some studies of media art literature examine the insertion of avant-garde concepts into web-related artworks by analyzing aesthetic issues of techniques, and the viewer's perspective, but not the artist's intention. For example, German media studies researcher Roberto Simanowski (2011) links the transformation of web texts into art media with modern artistic techniques, especially/such as collage, assemblage, and everyday materials, as well as Dada's literary techniques

In my interview data, the artists assert the importance of studying pioneering ideas. In response to different research questions in this study, the artists frequently note a significant influence of avant-garde ideas. Yet, the artists' responses do not show a clear picture of which particular art pioneers' idea evolves into a specific interactive web-based art. Recalling what was noted in Chapters V and VI, only Lozano-Hemmer points out the connection between the feature of instructions in his work and Duchamp's readymades. This further exploration of the specific historical ideas and the artists' creation of online interactivity may suggest relevant courses of art history and theories which focus on particular themes in additional to offering art history courses in general.

In addition to artistic historical contexts in general, the three selected artists consider Duchamp's ideas as important inspirations to their creation of online interactivity. For example, Lozano-Hemmer and Neddam use Duchamp's readymades as

a foundation for developing their interactive web-based art. In particular, their practices of online interactivity are inspired by the Duchampian concept of the viewer's painting. The three selected artists state that their interactive web-based work is not completed until the user's engagement. The fact that the user completes the work echoes a contemporary art issue of authorship. How is the issue of authorship considered in the artistic process of digital interactivity? If interactivity and interactions are fundamental features of some digital technologies, what the relationship among creation, interactivity, and the authorship of the creator and the user is formed? The question of authorship in the creation of digital interactivity may probe the role of creator in the artistic process. Future studies on these questions may help to train art students to be artists in a digital society.

Studio Pedagogy

In order to explore the relationship between creation of online interactivity and studio teaching, this study focuses on the participating teaching artists' artistic and teaching experiences, rather than their art students' learning experiences. The interview data reveals that the artists' professional experiences inform their studio teaching. In addition, the artists consider students' artistic processes as the same as their own. However, when they were asked about their studio teaching, the artists tended to describe their pedagogies in a general sense, rather than try to specifically emphasize online interactivity. For the artists, their role of the artist-as-teacher is to guide their students in developing the ability to think holistically, and give them problem-solving skills in the students' individual artistic processes.

Future studies may look into why the artist sees studio teaching in a general sense although they teach interactivity-related studio courses. This inquiry may help determine whether there are differences between teaching traditional and digital media.

During the process of data analysis, Schön's concept of reflection-in-action allowed this study to uncover the relationship between the three artists' professional experience and studio teaching. However, the findings further my research inquiries from an enactivist perspective of ecological thinking and collective learning activities (Davis & Sumara, 1997; Fenwick, 2000). In an enactivist setting, experiential learning treats "knowledge-as-(inter) action," to quote Canadian education scholars Brent Davis and Dennis Sumara (1997). As Fenwick (2000) suggests, "Educators can also help learners understand their involvement and find honest ways to record the expanding space and possibilities" (p. 263).

In addition, the teaching-learning process in a studio course echoes the enactivist perspective of a complex system in education. According to Fenwick (2000), in this complex ecology, "learning is thus cast as continuous invention and exploration produced through the relations among consciousness, identity, action and interaction, and objects and structural dynamics of complex systems" (p. 262).

This section Studio Pedagogy suggests further reflection on the following themes: conversational interaction, positive mindset, and academia.

Conversational interaction. One of the activities the three selected artists have in common is having conversation among their students about each student's project. According to American art educator Terry Barrett Barrett's (1988) and Eve Harwood's (2007) studies on studio art courses, the main purpose of conversation and critique in studio teaching is for assessment. However, my findings reveal two other purposes of directing and developing conversation for the artists' educational concerns. First, conversational interaction between the artists and their students as a teaching approach better identifies and understands the student's learning desires and needs. Second, conversation allows the artists to provide proper advice on their students' art projects by recalling the artists' own past experiences. The artists aim to help the student develop their own meaning-making through a flow of conversation.

In addition, in the conversation, the role of the three selected teaching artists mirrors an enactivist educator. As Fenwick (2000) suggests, the role of an enactivist educator is: (1) a communicator who "[assists] participants to name what is unfolding around them and inside them, to continually rename these changing nuances, and to unlock the tenacious grasp of old categories and restrictive or destructive language that strangles emerging possibilities," (2) a story maker, who "helps trace and meaningfully record the interactions of the actors and objects in the expanding spaces," and (3) an interpreter who "[helps] learners to make sense of the patterns emerging among these complex systems as well as to understand their own involvements in these patterns" (p. 263).

Future studies may look into the following inquiries: How does a teaching artist direct a good conversation and continue the flow of conversation in order to guide the art student in developing their own meaning? How does one develop better or different conversational techniques and skills? What challenge does one face when inviting the student to participate in a conversation on the creative development of their project? How does one interpret and connect complex actors and factors revealed in the student's artistic process for the student's own meaning making? These inquiries may help us better understand the importance of conducting conversation in studio teaching and learning in higher art education.

Positive mindset. Although this study focuses on the teaching experience, the interview data shows the artists' observations of the students' learning process. According to the artists, their students often involve complex actions when realizing individual art projects. That is, the artists' students experience various challenges in the artistic process. Recalling data analysis in Chapter V, the artists' students' challenges encompass a variety of issues, including conceptual, theoretical, technological, technical, financial, and emotional matters. For example, Hershman Leeson's students commonly had financial fears that they would not have enough money to support their artistic

careers. Another example is Neddam's student who worked with software but received a bad review for a final project from other faculty members.

The two examples show that the artist's students would be anxious when developing their own meaning-making in the artistic process. As such, the artists would help their students to establish a set of positive attitudes and mindsets in the artistic process. Giving emotional support in the teaching and learning process of studio courses relates to the enactivist perspective of those cognitive processes. As Fenwick (2000) describes, "cognition depends on the kinds of experience that come from having a body with various sensorimotor capacities embedded in a biological, psychological, cultural context" (p. 261).

Through the lens of enactivism, future studies may probe into the following questions: What other emotions may occur in the student's artistic process? What triggers the student's frustrations in the process? How does a teaching artist mentor and support the student's emotions and develop a positive mindset in the student's artistic process? A better understating of these questions may help art students to keep from being derailed in unproductive ways.

Academia. Both Lozano-Hemmer and Neddam describe the different teaching environments at their respective institutions in the interviews.

Lozano-Hemmer led workshops at institutes and museums, in addition to teaching at universities. Outside academia, he taught workshops with a strong focus on technical information. He "invited only programmers, engineers, artists who are makers or hackers" (Personal Communication, November 11, 2015).

Neddam mainly describes her teaching experience at different academic institutions. In an art college in Amsterdam, she would not mention her practice of Internet art when teaching for two reasons. One is that her web-based art project was anonymous. Second, the creation of Internet art was not so encouraged. In Chapter VI, Neddam recalled that her student received a bad review from other faculty members for

the semester final project because she incorporated online applications. On the other hand, Neddam was invited to be a guest professor at Université de Montréal in Montreal, Canada, which encouraged and prompted Internet art practices. She would then share her own artistic experience of web-based art in her teaching.

These examples show the impact of institutional tradition on teaching and learning and further research inquiries into academia's attitude toward the creation of digital interactivity in fine art programs in art colleges. For example, how academia's interest would influence the teaching and learning of online interactivity? How can academia best support studio-based teaching and learning of digital interactivity, in particular web-based art? These questions may help us understand how to improve teaching and learning environments in higher art education programs geared toward digital interactivity.

I would like to conclude this study by quoting the participating artist Martine Neddam. When asked "How can online interactivity be taught?," Neddam responded:

> It doesn't have one meaning, but just opens a conversation…. That's what I think of good work of art is. That's how I understand also interactivity like an ongoing conversation…. In a conversation, you can stop a conversation by having a certain attitude that stops all conversation. No good listening. No good sense of dialogue. That sense of dialogue, that sense of conversation, ongoing conversation is for me what the best thing you can learn from it and the best way you can teach. It's not a technology. It's an attitude. It's the attitude of listening, and answering, and that the meaning is always in between is always a part of a dialogue. (M. Neddam, personal communication, August 21, 2015)

Neddam's statement above shows that her artistic practice and pedagogy of online interactivity has a reciprocal relationship with the nature of collective conversation, existing in each other and interacting with each other. This essential of interaction among professional artistic practice, teaching, and learning is found in Davis and Sumara's (1997) suggestion of an enactivist educator. As Davis and Sumara overserve, "Knowledge, then, was not some sort of object that was created during or in the

interaction; rather, the ongoing, ever-evolving interaction was itself the form and substance of the collective knowledge" (p. 115).

My goal in this study was to move toward a more global view of the role of online interactivity in the artistic process from the creator's own voice. To do so, I employed a social science research method of case studies. I began this study with a constructivist perspective on the relationship between the practitioner's past experience and teaching. In the reflexive process of developing meanings through the examination and interpretation of interview data, literature of art education, adult education, and art history allowed me to connect key concepts that emerged through the data. This study may provide valuable insights from a holistic view of the artists' artistic and critical pursuits in conceiving and creating online interactivity, affirming the reciprocal relationship among their experience, pedagogies, and their students' artistic process.

This study's findings led me to reflect on my initial attitude toward this research, which was "art for art's sake." That is, I looked into what comprised the artistic process of online interactivity from two primary components: art history and technical requirements (e.g., technologies, techniques, and skills). Indeed, the findings discovered the links between the teaching artists' professional experiences and their studio teaching. However, as I was looking more closely at the interview data to question accounts, the creation of online interactivity is in fact the artists' "activist intervention" in digital culture, to quote Lozano-Hemmer. That is, the artists reflect on digital culture by creating interactive web-based art in order to be aware of the world we are situated in. For example, Lozano-Hemmer's project *Friendfracker* (2013), which was terminated by the social network giant Facebook on April 25, 2013 due to violations of the corporation's core value. In another example, Hershman Leeson uses the portrait of a former United States soldier Chelsea Manning as one of her artificial intelligence bots. It is humanistic perspectives which underlay the artists' interactive web-based art. The use of digital technologies allows them to realize their awareness and reflection on these important

issues in digital culture. Furthermore, the artists hope to evoke the user's awareness through their interactive web-based work. The three participating digital media artists' humanistic thinking makes online interactivity more meaningful.

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Appendix A

Interview Protocols

Table A.1. Interview Protocols: The Three Selected Artists' Practices of Online Interactivity

Main question	Interview Questions
How do the three selected digital media artists conceive of online interactivity, and what role does online interactivity play in their artistic processes?	What do you think about digital interactivity which might be essential to your art-making process?
	How do you describe interactivity in your web-based art projects?
	What is the main purpose of using interactivity in creating your web-based art work?
What artistic strategies do the three selected digital media artists incorporate into their ongoing artistic processes of interactive web-based art?	Can you describe how you incorporate interactivity in your web-based art-making?
	Can you describe how online interactivity changes the relationships between the artist, the artistic process, and the work of art?
	Can you describe this experience of producing online interactivity by recalling your early and recent web-based artworks, any in particular?
What forms of online interactivity might be specific to the three selected digital media artists' practices?	What kinds of interactivity do you expect to produce in your web-based art?
	What features of interactivity can you describe in your early and recent web-based artworks?
How do specific artistic techniques, and technologies, skills inform online interactivity in the artistic process?	How are digital technologies relevant to creating interactive, online web-based works?
	Can you describe what technologies were required to create your early web-based art works as well as your recent projects, any in particular?
How do the three selected digital media artists' situate their interactive web-based work in historical contexts of art?	What artistic historical examples and ideas do you consider connections to the use of online interactivity in your practice?
	Can you describe any examples from early art ideas and movements in the history of art which might relate to your interactive web-based art practice?

Note. This table presents an interview script based on a semi-structured type of in-depth interview. Interviewing followed the structure of this script. This study conducted a primary interview. If needed, the researcher followed up with a secondary interview to clarify data collected.

Table A.2. Interview Protocols: The Three Selected Artists' Studio Pedagogies in Relation to Their Artistic Practices

Main Question	Interview Questions
How do their practices of online interactivity influence their studio art teaching, in higher education?	When teaching a studio art course, how your experience of creating interactive web-based art might contribute to your studio art teaching?
Sub-questions	
How are changes in the three selected digital media artists' artistic processes of online interactivity taken into consideration in their pedagogy?	What are connections between your experience of creating online interactivity and studio art teaching?
	How can creating online interactivity be taught as it involves an immaterial art-making process, such as interactivity itself and digital technology?
What instructional strategies do the three selected digital media artists use and recount the relationship between their studio art teaching and artistic experiences of online interactivity?	What do you teach young art students about using online interactivity?
	What studio art curriculum content do you develop for online interactivity related topics?

Note. This table presents an interview script based on a semi-structured type of in-depth interview. Interviewing followed the structure of this script. This study conducted a primary interview. If needed, the researcher followed up with a secondary interview to clarify data collected.

Appendix B

Letter of Invitation

Dear _____:

My name is Chia-Ling Lee. I am a doctoral candidate in college teaching of the Art and Art Education Program at Teachers College, Columbia University in New York City. I am conducting electronic interviews via email or online conference for my dissertation research. I would like to invite you to take part in my research study, which explores how artists conceive and work with online interactivity in their own creative process of art-making and subsequently, how they reflect their creative experience in studio art teaching. My dissertation topic is Interactivity in the creative process of web-based art: case studies of teaching digital media art pioneers. The study will enhance our understanding of the role of online interactivity in the creative process and moreover the relationship between the creative act of online interactivity and studio art teaching. Additionally, this study will extend a theoretical understanding of interactivity as applied to new media and particularly web-based art, in order to reconceptualize digital interactivity in the creative process through a few select artists' direct voices and experiences.

Participation in this study involves:

- Completing the electronic documents of the Informed Consent and Participant Rights with your electronic signature and agreeing to the terms and conditions of the study, which will include the audio recording of the interview. You may electronically sign the Informed Consent and Participant Rights documents. Alternatively, you may print, sign, scan, and email the Informed Consent and Participant Rights and email me the signed electronic Informed Consent and Participant Rights.
- Participating in an interview with the researcher (each approximately one hour) at a mutually convenient time and location.

The interview can be conducted by email or online conference according to personal preferences. If needed, the researcher will follow up with a second interview to clarify your responses. As your narratives of your direct experience are valuable as key components to the study, the researcher may contact you within a three-month period with follow-up questions, depending on your availability.

With your permission, the interview will be audiotaped and the researcher may take notes during the interview. The audio recording is to accurately record your responses and will be used for transcription purposes only.

Should you choose not to be audiotaped, the researcher will take notes instead. Should you not feel comfortable at any moment, audio recording can be turned off at your request. Or should you not wish to continue with the interview, the interview can be stopped at any time.

If there are any questions you would rather not answer or that you do not feel comfortable answering, please indicate during the interview process and the researcher can skip the question. Your interview responses in this study will not be modified, except to fix spelling and grammar errors.

Due to the nature of this research study, your responses to interview questions and your artwork details will reveal your identity and presented as the data and research findings in this study. Your identifying information will be stated in this research study. Should this be concern, you may discontinue participation in this study.

With your permission, your interview responses will be used for purposes of presenting the data for publication purposes, including publishing dissertation, journal articles, conference presentations and books.

Thank you for your time and consideration.

Sincerely,
Chia-Ling

Chia-Ling Lee
Doctoral candidate of College Teaching, Art and Art Education
Teachers College, Columbia University, New York
Email: cl2577@columbia.edu
Tel: +1.347.504.0822

Appendix C

Informed Consent

Teachers College, Columbia University
525 West 120th Street
New York NY 10027
212 678 3000
www.tc.edu

INFORMED CONSENT

Interactivity in the creative process of web-based art: case studies of teaching digital media art pioneers

DESCRIPTION OF THE RESEARCH:
You are invited to participate in a research study on how artists conceive and work with online interactivity in their own creative process of art-making and subsequently, how they reflect their creative experience in studio art teaching. The participant's narratives of their direct experience are valuable as key components to the study. The participant will be asked to participate in one interview. In addition, a follow-up interview may be requested for added clarification. Interviews will be conducted within approximately three months depending on your availability.

The research will be conducted by Chia-Ling Lee, a doctoral candidate, at Teachers College, Columbia University. Interviews can be conducted by email or online conference according to your preferences.

During this study, you will be asked to answer some questions regarding your artistic practice of conceiving and working with online interactivity and digital technology, in the context of your web-based art works. However, please feel free to expand the conversation on the topic or talk about related ideas.

With your permission, the interview will be audiotaped and the researcher may take notes during the interview. The audio recording is to accurately record your responses, and will be used for transcription purposes only.

During the interview, should you choose not to be audiotaped, the researcher will take notes instead. Should you not feel comfortable at any moment, audio recording can be turned off at your request. Or should you not wish to continue with the interview, the interview can be stopped at any time.

If there are any questions you would rather not answer or that you do not feel comfortable answering, please indicate during the interview process and you can skip the question.

The participant's interview responses in this study will not be modified, except to fix spelling and grammar errors.

With your permission, your interview responses will be used for purposes of presenting the data for publication purposes, including publishing dissertation, journal articles, conference presentations and books.

RISKS AND BENEFITS:
This study will pose minimal risks to subjects that are not greater than those ordinarily encountered in a similar conversation encouraging reflection. It will be possible that you may feel a sense of discomfort as you will be asked to recall work-related experiences. The risk of discomfort, however, should be minimized since participation is strictly voluntary and you may discontinue participation at any time with no penalty or fear of recourse. There are no direct benefits to participation in this study.

PAYMENTS:
There will be no payment for your participation, but you will receive feedback about this study in the form of a brief summary of the dissertation's findings.

DATA STORAGE TO PROTECT CONFIDENTIALITY:
Due to the nature of this research study, your responses to interview questions and your artwork details will reveal your identities and presented as the data and research findings in this study. The participant's identifying information will be stated in this research study. Should this be concern, you may discontinue participation in this study.

Interview data collection in this research will focus on digital media artists' creative experiences of online interactivity and their reflective practices in studio art teaching. All collected data will be stored in a secured password protected folder on the researcher's computer in the researcher's home office. Only the researcher will have access to the password. Paper files will be preserved in a private and secured space in the researcher's home office. Only the researcher will have access to the home office.

The actual data of original interview recordings will be archived and stored for educational and publishing purposes. No original interview recordings will be destroyed. Should you disagree, you may request to destroy original interview recordings five years after the dissertation is published.

TIME INVOLVEMENT:
The interviewing process will take approximately within three months.

HOW WILL RESULTS BE USED:
With your permission, your interview responses will be used for purposes of presenting the data for publishing dissertation, journal articles, conference presentations and books.

Appendix D

Participant's Rights Forms

Teachers College, Columbia University

525 West 120th Street
New York NY 10027
212 678 3000
www.tc.edu

PARTICIPANT'S RIGHTS

Principal Investigator: Chia-Ling Lee

Research Title: Interactivity in the creative process of web-based art: case studies of teaching digital media art pioneers

- I have read and discussed the Research Description with the researcher. I have had the opportunity to ask questions about the purposes and procedures regarding this study.
- My participation in research is voluntary. I may refuse to participate or withdraw from participation at any time without penalty.
- Any information derived from the research project that personally identifies me will not be voluntarily released or disclosed without my separate consent, except as specifically required by law.
- If at any time I have any questions regarding the research or my participation, I can contact the investigator, who will answer my questions. The investigator's phone number is +1.(347)504.0822 and email address is cl2577@columbia.edu.
- If at any time I have comments, or concerns regarding the conduct of the research or questions about my rights as a research subject, I should contact the Teachers College, Columbia University Institutional Review Board /IRB. The phone number for the IRB is (212) 678-4105, the email is IRB@tc.edu. Or, I can write to the IRB at Teachers College, Columbia University, 525 W. 120th Street, New York, NY, 10027, Box 151.
- I should complete the electronic documents of the Informed Consent and Participant Rights with my electronic signature and agreeing to the terms and conditions of the study. I may electronically sign the Informed Consent and Participant Rights documents. Alternatively, I may print, sign, scan, and email the Informed Consent and Participant Rights and email the signed electronic Informed Consent and Participant Rights to Principal Investigator Chia-Ling Lee.
- The electronic and written materials will be viewed only by the principal investigator and members of the dissertation committee.

- Audio-taping is part of this research for online conference interview. Only the principal investigator and members of the dissertation committee will view the written, and/or audio taped materials.
    1. I [ ] consent to be audio taped.
    2. I [ ] do NOT consent to being audio taped.
- Email interview responses:
    1. I [ ] may be viewed in an educational and cultural setting outside the research.
    2. I [ ] may NOT be viewed in an educational and cultural setting outside the research.
    - My signature means that I agree to participate in this study.

Participant's signature: _____ Date:____/____/____

Name: _____

Appendix E

Demographic Information

Research Participant	Region	Gender	Educational Background	Teaching Experience	Primary Working Media
Lynn Hershman Leeson (born 1941)	North America (San Francisco, New York, USA)	Female	B.A. in Education, Museum Administration and Fine Arts, Case Western Reserve University, Cleveland (1963) M.A. in Art Criticism, San Francisco State University (1968)	Emeritus Professor, University of California, Davis, USA A.D. White Professor, Cornell University, USA.	Drawing, photography, film and video, performance, installation, the Internet and web browsers, digital technology
Rafael Lozano-Hemmer (born 1967)	North America (Montreal, Canada)	Male	B.S. in Physical Chemistry, Concordia University, Montréal (1989)	Faculty Associate, the Graduate School of Design, Harvard University, Boston, USA. Giving workshops at universities and museums worldwide	Installation, architecture, technological theater and performance, the Internet and web browsers, mobile applications, digital technology
Martine Neddam (born 1953)	Europe (Amsterdam, Netherlands)	Female	B.A. in Linguistics and Literature, University of Lyon (1975) MA in Stage Design, School of Architecture, Lyon (1983) MA in Visual Arts Institut des Hautes Études en Arts Plastiques, Paris (1988)	Teacher Beeldende Kunst, Amsterdam, Netherlands Visiting Professor, Université du Québec à Montréal (UQAM), Canada	Installation, texts, images, the Internet and web browsers, software, digital technology